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Long-Term Ecological Monitoring Field Sampling Plan for 2006

Thomas Haney
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May 2006

Idaho Cleanup Project

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ABSTRACT

This field sampling plan describes the field investigations planned for the Long-Term Ecological Monitoring Project at the Idaho National Laboratory Site in 2006. This plan and the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Deactivation, Decontamination, and Decommissioning* constitute the sampling and analysis plan supporting long-term ecological monitoring sampling in 2006. The data collected under this plan will become part of the long-term ecological monitoring data set that is being collected annually. The data will be used to determine the requirements for the subsequent long-term ecological monitoring.

The primary goals of this plan, in coordination with other Idaho National Laboratory monitoring plans, include the following:

- Verifying that the remedial objectives specified in Idaho National Laboratory Site Comprehensive Environmental Response, Compensation, and Liability Act records of decision are maintained for ecological receptors

- Determining that legacy contamination in Idaho National Laboratory Site soil and water does not have unacceptable long-term sitewide ecological impacts

- Identifying and quantifying adverse ecological effects, if any, resulting from Idaho National Laboratory Site contamination

- Providing information to support the selection and evaluation of appropriate ecological indicators for long-term monitoring.

This plan guides the 2006 investigations, including sampling, quality assurance, quality control, analytical procedures, and data management. As such, this plan will help to ensure that the resulting monitoring data will be scientifically valid, defensible, and of known and acceptable quality.

The areas to be investigated as part of this plan include the Central Facilities Area, the Radioactive Waste Management Complex, the Materials and Fuels Complex (formerly Argonne National Laboratory-West), the Materials and Fuels Complex Industrial Waste Pond, the onsite terrestrial reference area, and the offsite aquatic reference area. Analytical and effects data will be collected during the 2006 field activities. Analytical data collection will include biotic (e.g., mice) and abiotic (e.g., soil) samples. Effects data will range from vegetative cover and small mammal population surveys to histopathic studies of mice.

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ACRONYMS

AA	alternative action
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
COC	chain of custody
COPC	contaminant of potential concern
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
DQO	data quality objective
DRF	Document Revision Form
DS	decision statement
EBR-II	Experimental Breeder Reactor II
EPA	U.S. Environmental Protection Agency
ESH&QA	environment, safety, health, and quality assurance
FCF	Fuel Cycle Facility
FSP	field sampling plan
FTL	field team leader
GDE	guide
HSO	health and safety officer
IC	Interceptor Canal
ICDF	Idaho CERCLA Disposal Facility
ICP	Idaho Cleanup Project
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory (formerly INEEL)
IWP	Industrial Waste Pond
JSA	job safety analysis
JSS	job site supervisor

LTEM	long-term ecological monitoring
MCP	management control procedure
MFC	Materials and Fuels Complex
NA	not applicable
NRTS	National Reactor Testing Station
PLN	plan
PPE	personal protective equipment
PRD	program requirements document
QAPjP	quality assurance project plan
RCT	radiological control technician
RWMC	Radioactive Waste Management Complex
SAM	Sample and Analysis Management
SDA	Subsurface Disposal Area
SOW	statement of work
TEM	template
TPR	technical procedure
TREAT	Transient Reactor Test Facility
TRU	transuranic
TSA	Transuranic Storage Area
WGS	Waste Generator Services
WIPP	Waste Isolation Pilot Plant
ZPPR	Zero Power Physics Reactor

Long-Term Ecological Monitoring Field Sampling Plan for 2006

1. INTRODUCTION

This field sampling plan (FSP) was prepared for the Long-Term Ecological Monitoring (LTEM) Project of the Idaho Cleanup Project (ICP) at the Idaho National Laboratory (INL) Site. This plan identifies the activities for the characterization project to perform sampling. This plan was prepared according to the requirements outlined in ICP Management Control Procedure (ICP-MCP)-9439, "Environmental Sampling Activities at the INEEL;" MCP-3562, "Hazard Identification, Analysis, and Control of Operational Activities;" and Template (TEM)-104, "Model for Preparation of Characterization Plans."

This characterization plan establishes the procedures and requirements that will be used in 2006 to perform field sampling and laboratory analyses. The areas of the INL Site to be investigated in 2006 include the Central Facilities Area (CFA), the Radioactive Waste Management Complex (RWMC), the Materials and Fuels Complex (MFC) (formerly Argonne National Laboratory-West), the MFC Industrial Waste Pond, one onsite terrestrial reference area, and one offsite aquatic reference area.

Analytical and effects data will be collected during the 2006 field activities. Analytical data collection includes biotic (e.g., mice) and abiotic (e.g., soil) samples. Effects data collection includes evaluation of vegetation, invertebrate, mammal, and avian community structures, and histopathic studies of mice.

1.1 Project Objectives

Under the *Long-Term Ecological Monitoring Plan for the Idaho National Engineering and Environmental Laboratory* (INEEL 2004), the objective of the LTEM Project is to assess ecological effects from contaminants that are covered under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.). The LTEM plan approach, based on the results of the ecological risk assessment presented in the *Comprehensive Remedial Investigation/Feasibility Study for Waste Area Groups 6 and 10 Operable Unit 10-04* (DOE-ID 2001), meets the requirements for sitewide ecological monitoring set forth in the *Record of Decision Experimental Breeder Reactor-I/Boiling Water Reactor Experiment Area and Miscellaneous Sites* (DOE-ID 2002).

The *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Deactivation, Decontamination, and Decommissioning* (QAPjP) (DOE-ID 2004) governs *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991) project work performed by INL Site employees, subcontractors, and employees of other companies or U.S. Department of Energy (DOE) laboratories.

In addition to the planned sampling, the project leads may decide to move sample plots or collect opportunistic plant, soil, or small mammal samples at the areas of concern if possible indicators (e.g., stained soil or mutated animals) of contaminant exposure are evident.

The Record of Decision (DOE-ID 2002) authorized ongoing studies. One ongoing study includes the continued use this year of the less costly INL Site field-based radionuclide measurement system for samples collected at RWMC.

1.2 Site Description

The INL Site occupies about 2,305 km^2 (890 mi^2) of the northwestern portion of the eastern Snake River Plain (see Figure 1-1). The Snake River Plain is about 97 km (60 mi) wide and over 600 km (370 mi) long. The elevation averages about 1,524 m (5,000 ft).

The INL Site is a semiarid desert with a mean annual precipitation of less than 22 cm (9 in.) and large daily and seasonal temperature variations. In winter, air temperatures may not rise above freezing for weeks, and the topsoil usually remains frozen from mid to late November through early March. Snow cover typically persists for 2 to 3 months, but it is highly variable between years. During the summer, low humidity and clear skies result in relatively high maximum temperatures at 30 to 35°C (85 to 95°F). At night, temperatures drop below 10°C (50°F).

The INL Site lies within the eastern Snake River Plain, which is a low-relief volcanic province that formed in response to movement of the North American tectonic plate over the stationary hotspot that is located under Yellowstone National Park. Bordered by high mountains, the eastern Snake River Plain is a high-desert basin containing basalt lava flows and various river, wind, and lake sediments. Large basin-and-range normal faults adjacent to the plain and basaltic volcanism on the plain are ongoing geologic processes that generate seismic and volcanic hazards for INL Site facilities. Hackett and Smith (1992) provide a detailed summary of the regional geologic history.

Sagebrush flats, basalt outcrops, and volcanic buttes help isolate the INL Site facilities and ecological habitats. The INL Site is bounded on the east and northwest by the Lost River and Lemhi Ranges and the mouths of the Big Lost River and Little Lost River Valleys, and on the north by the mouth of Birch Creek Valley and the southern tip of the Beaverhead Mountains of the Bitterroot Range. Due to this access, large numbers of raptors and mammals funnel onto the INL Site for wintering. In addition, because the INL Site border is secure and domestic grazing has been eliminated from the core area for more than 50 years, the site has become a refuge for native plants and wildlife.

1.3 Sampling Locations

Yearly sampling refers to data types collected annually, although the locations at which data are collected vary. Table 2 of the LTEM plan (INEEL 2004) provides the locations and suggested initial sampling year for each area of concern. As discussed, in 2006 the CFA, RWMC, MFC, MFC Industrial Waste Pond, and reference areas have been identified for sampling.

Yearly sampling will be performed as discussed in the LTEM plan (INEEL 2004) and in this FSP. The areas of concern and the sampling to be performed in 2006 are summarized in Table 1-1 and discussed below.

1.3.1 Central Facilities Area

Located in the south-central part of the INL Site, CFA currently serves as the operational headquarters for services at INL Site.

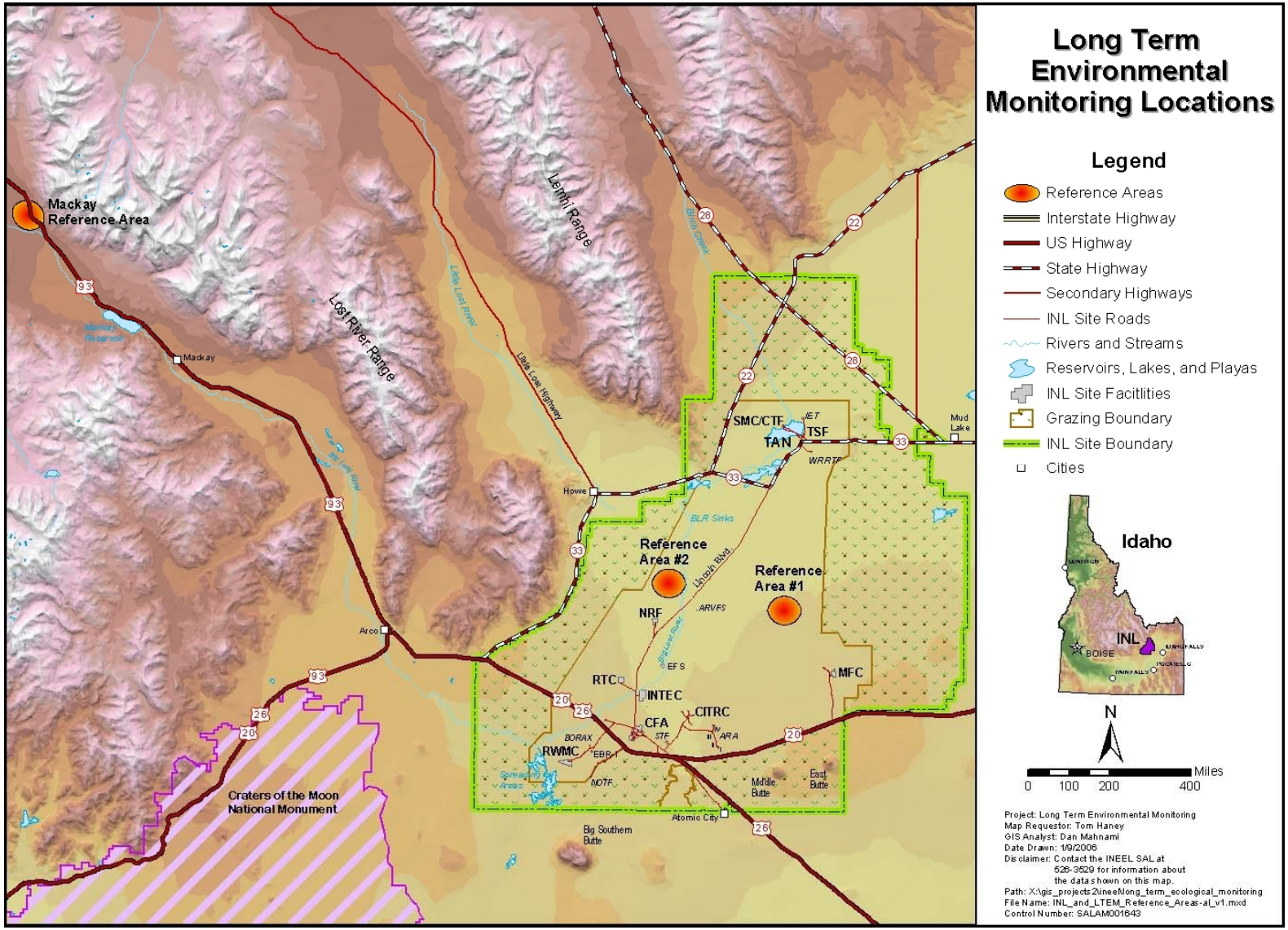

Figure 1-1. Map of the INL Site showing the locations of major facilities and sampling areas.

Table 1-1. Sampling activities by sampling area planned for 2006.

Tasks	CFA	RWMC	MFC	MFC Pond	Terrestrial Reference Area	Aquatic Reference Area
Population data						
Birds	X	X	X	—	X	—
Mammals	X	X	X	—	X	—
Plants	X	X	X	—	X	—
Reptiles	X	X	X	—	X	—
Soil fauna	X	X	X	—	X	—
Analytical data						
Soil	X	X	X	—	X	—
Vegetation	X	X	X	—	X	—
Mammal	X	X	X	—	X	—
Water	—	—	—	X	—	X
Sediment	—	—	—	X	—	X
Aquatic plant	—	—	—	X	—	X
Effects data						
Histopathy	X	X	X	—	X	—
Earthworm toxicity	X	X	X	—	X	—
Seedling toxicity	X	X	X	—	X	—
Disturbance ranking	X	X	X	—	X	—
Soil	X	X	X	—	X	—

1.3.1.1 Environmental Setting—Central Facilities Area. CFA is located in the south-central portion of the INL approximately 93 km (50 mi) from the cities of Idaho Falls and Pocatello. The original facilities at CFA were built in the 1940s and 1950s to house the U.S. Navy's gunnery range personnel. The facilities have been modified over the years to fit the changing needs of the INL and now provide craft, office, service, and laboratory space.

At CFA, most land surfaces are covered by landscaping, facilities, and pavement with areas of natural vegetation, disturbed communities, and bare ground. Natural communities are also found around the perimeter. Areas outside the boundary include sagebrush/rabbitbrush shrub-steppe, sagebrush-steppe on lava, and grasslands.

Wildlife species present in and around the CFA include birds, mammals, and reptiles that are associated with facilities, sagebrush/rabbitbrush, grasslands, and disturbed habitats, deciduous trees and shrubs, and water (e.g., facility ponds and drainage areas). Both aquatic and terrestrial species are potentially present. The relatively continuous stretches of sagebrush steppe around CFA make good habitat for many game species like sage grouse (*Centrocercus urophasianus*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*); small mammal species such as deer mice (*Peromyscus maniculatus*) and least chipmunk (*Tamias minimus*); and birds—including yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), northern harrier (*Circus cyaneus*), and western meadowlark

(*Sturnella neglecta*)—especially near the CFA sewage lagoons and center-pivot sprinkler system); and areas of grassland provide habitat for species such as the western meadowlark (*Sturnella neglecta*). Buildings, lawns, ornamental vegetation, and disposal/drainage ponds at the facility are also utilized by a number of species such as waterfowl, raptors, rabbits, mule deer, and bats. No areas of critical habitat as defined in the Code of Federal Regulations (40 CFR Part 300) are known to exist in or around CFA.

Vegetation near CFA is similar to the rest of the INL Site, consisting mainly of sagebrush (*Artemisia spp.*), green rabbitbrush (*Chrysothamnus viscidiflorus*), crested wheatgrass (*Agropyron cristatum*), needle-and-thread grass (*Stipa comata*), and lesser amounts of other shrubs, grasses, and forbs.

1.3.1.2 Contaminants of Potential Concern—Central Facilities Area. CFA contamination sites include historical spills, tanks, landfills, ponds, leach fields, and leach pits. CFA has no enclosing fence. Many of the sites investigated under CERCLA are next to buildings. The landfills are located north of the main CFA. Cleanup actions at CFA under CERCLA have included removals of mercury- and asbestos-contaminated soil, of laboratory French drains, and of heavy metal- and petroleum-contaminated soil. A soil cap was placed over the CFA-08 drainfield, which was contaminated with low concentrations of radionuclides, chiefly Cs-137.

An active, solid-waste landfill north of CFA receives office and cafeteria waste, but soil covers and fences were placed on the inactive CFA Landfills I, II, and III during the summer of 1996 as required by the Record of Decision for Operable Unit 4-12 (INEL 1995). Process wastewaters from laboratories, medical facilities, and equipment repair shops are all routed to the sanitary sewer system. The CFA sewage treatment plant consists of three lined ponds where biological treatment of the wastewater takes place. The effluent is then sprinkler-irrigated on the land surface.

Metals (mercury, lead, and copper) are the primary contaminants of potential concern (COPCs) at CFA. Gamma-emitting radionuclides (e.g., Cs-137) are also considered COPCs due to possible windblown contamination. Table 1-2 shows the general COPCs at CFA.

1.3.1.3 Probable Transport Pathways and Sampling—Central Facilities Area. Metals and radionuclides can affect animals through skin contact, inhalation, and ingestion. Ecological receptors such as deer mice or cottontail rabbits are most likely to contact the contaminants during foraging and burrowing. Animals could ingest soil-absorbed contaminants during feeding, preening, and grooming. Plants and invertebrates could bioaccumulate contaminants, and, through the food web, other animals could be exposed indirectly by eating plants or invertebrates that have absorbed or adsorbed contaminants from soil. During high winds, animals could inhale and ingest particulates. Ingestion also could occur if animals consume plants or invertebrates that have contaminated dust on them.

1.3.1.4 Selection of Sampling Locations. Locations at CFA that have both good habitat and possible contamination, but are not too disturbed by roads or other facility activities, were gridded into 100 × 100-m (110 × 110-yd) plots. Then 10 plots were chosen for sampling with a bias to sites that may have possible contamination (Figure 1-2).

Table 1-2. General COPCs summarized from the sitewide ecological risk assessments (INEEL 2004).

COPCs	TAN	RTC	INTEC	CFA	ARA/PBF	NRF[a]	MFC	EBR-I/BORAX
Inorganics	—	—	—	—	—	—	—	—
Arsenic[b]	X	X	—	X	X	X	X	—
Antimony[b]	X	—	—	—	—	—	—	—
Barium	X	X	X	X	—	—	X	—
Cadmium	X	X	X	X	X	—	X	—
Chromium (III)	X	X	X	X	—	—	X	—
Chromium (VI)	—	—	X	—	—	—	X	—
Cobalt	X	—	—	X	X	—	—	—
Copper	X	X	—	X	X	—	X	X
Cyanide[b]	X	—	—	—	—	—	X	—
Lead	X	X	X	X	X	X	X	X
Manganese	X	—	—	X	X	—	X	—
Mercury	X	X	X	X	X	X	X	—
Nickel	X	—	X	X	X	—	X	—
Selenium	X	X	X	X	X	—	X	—
Silver	X	X	—	X	X	—	X	—
Strontium	—	—	X	—	—	—	—	—
Thallium	X	X	—	—	X	—	—	—
Vanadium	X	—	—	X	X	—	X	—
Zinc	X	X	—	X	X	—	X	X
Organics	—	—	—	—	—	—	—	—
1,3-Dinitrobenzene	—	—	—	—	—	—	—	X
2,4-Dinitrotoluene	—	—	—	—	—	—	—	X
2,6-Dinitrotoluene	—	—	—	—	—	—	—	X
2-Amino-4,6-dinitrotoluene[c]	—	—	—	—	—	—	—	X
4-Amino-2,6-dinitrotoluene[c]	—	—	—	—	—	—	—	X

Table 1-2. (continued).

COPCs	TAN	RTC	INTEC	CFA	ARA/PBF	NRF[a]	MFC	EBR-I/BORAX
Royal Demolition Explosive RDX	—	—	—	—	—	—	—	X
Her Majesty's Explosive (HMX)[c]	—	—	—	—	—	—	—	X
1,3,5-Trinitrobenzene[c]	—	—	—	—	—	—	—	X
2,4,6-Trinitrotoluene	—	—	—	—	—	—	—	X
4-Methyl-4-hydroxy-2-pentane	—	—	X	—	—	—	—	—
2-Methylnaphthalene	X	—	—	—	—	—	—	—
Polychlorinated biphenyls, including aroclors-1248, -1254, and -1260[d]	X[d]	X[d]	X[d]	X[d]	X[d]	—	X[d]	—
Total petroleum hydrocarbons	X	—	—	X	—	—	—	X
Xylene[b]	—	—	—	—	—	—	—	—
Radionuclides[e]	—	—	—	—	—	—	—	—
Am-241, Co-60, Cs-134, Cs-137, Eu-152, Eu-154, Nb-94, Pu-238, Pu-239, Pu-239/240, Sr-90, U-235, U-238, and tritium	Not applicable (NA)	NA	NA	NA	NA	—	NA	NA

a. Significant uncertainty exists in the screening-level ecological risk assessment (NRF 1997).
b. Retained due to toxicity and common occurrence as a contaminant at CERCLA sites.
c. No sites have a hazard quotient >10 for this contaminant; however, it may be a potential contaminant of concern for postremediation confirmation sampling at ordnance sites.
d. Retained due to environmental persistence and potential for bioaccumulation.
e. Radionuclides were retained for Operable Unit 10-04 and were not screened for hazard quotients >10.

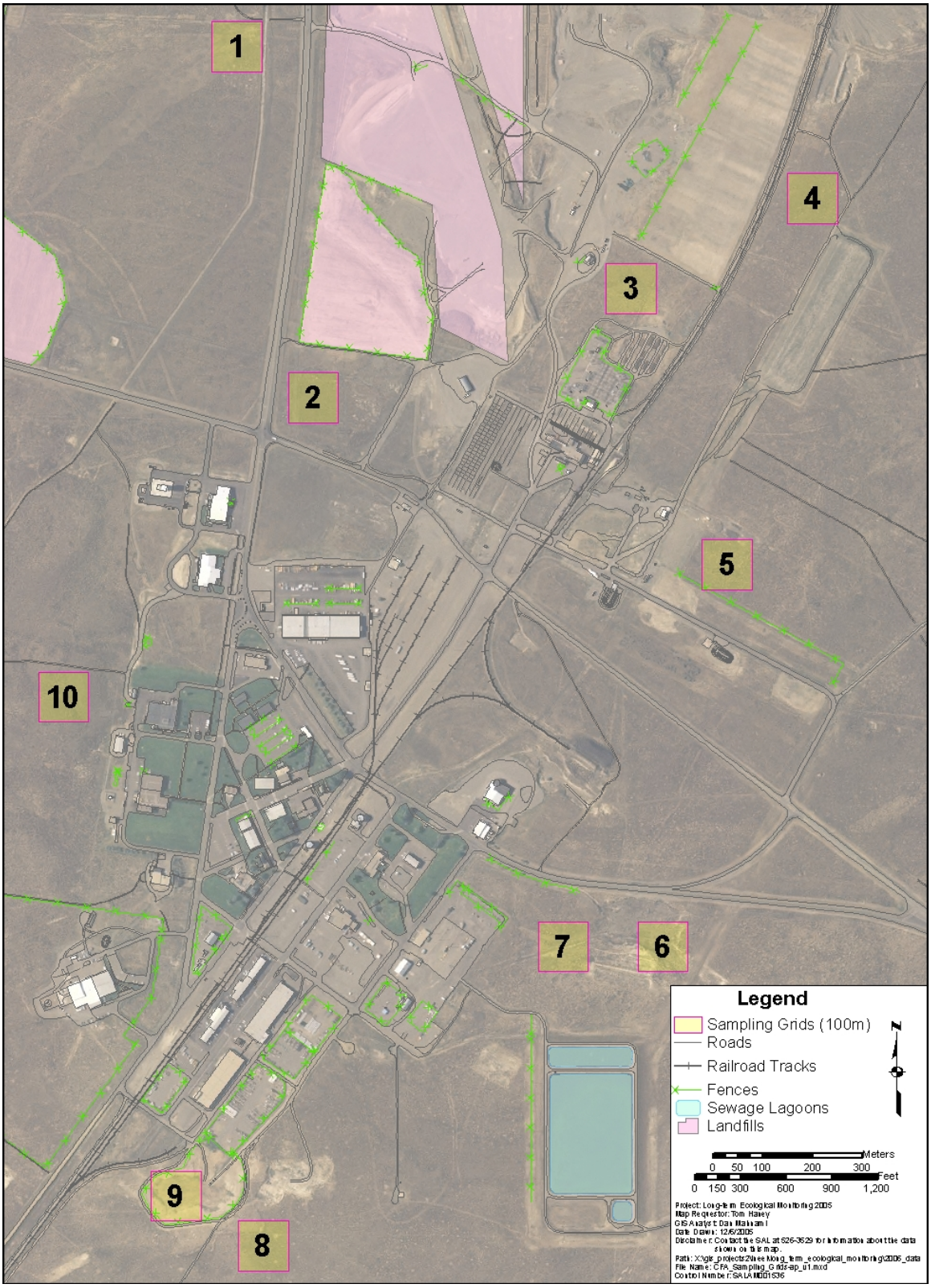

Figure 1-2. Map showing the CFA and the general locations of the 10 sampling plots.

1.3.2 Radioactive Waste Management Complex

The RWMC is divided into three separate areas by function: the Subsurface Disposal Area (SDA), the Transuranic Storage Area (TSA), and the administration and operations area. The original landfill, established in 1952 as a controlled area for disposing of solid radioactive wastes, has since 1954 also received defense wastes for storage. At that time, it was called the National Reactor Testing Station (NRTS) Burial Ground. Now part of the SDA, the original landfill covered 5.2 ha (13 acres) and was used for shallow land disposal of solid radioactive waste. In 1958, the disposal area was expanded to 35.6 ha (88 acres). Relocating the security fence in 1988 to outside the dike surrounding the disposal area established the SDA's current size as 39 ha (97 acres). The TSA was added to the RWMC in 1970. Located adjacent to the east side of the SDA, the TSA encompasses 23 ha (58 acres) and is used to store, prepare, and ship retrievable transuranic (TRU) waste to the Waste Isolation Pilot Plant (WIPP) southeast of Carlsbad, New Mexico. The 9-ha (22-acre) administration and operations area at the RWMC includes administrative offices, maintenance buildings, equipment storage, and miscellaneous support facilities. Several projects dedicated to research and development of shallow land burial technology and alternatives for removing, reprocessing, and repackaging transuranic wastes are also conducted at the RWMC.

1.3.2.1 Environmental Setting—Radioactive Waste Management Complex. The RWMC occupies about 72 ha (177 acres) 11 km (7 mi) southwest of CFA and 22 km (14 mi) northwest of Atomic City. The RWMC has been extensively seeded with crested wheatgrass (*Agropyron cristatum*) to control moisture infiltration and erosion. Areas on the site where seeding has not been successful, have been invaded by weedy species. Areas surrounding the RWMC support native communities. Sagebrush-steppe on lava communities are dominated by sagebrush (*Artemisia tridentata*), with large components of green rabbitbrush (*Chrysothamnus viscidiflorus*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) and make up nearly 90% of the natural cover in the area (INEEL 2002). The relatively continuous stretches of sagebrush steppe around the RWMC make good habitat for many game species like sage grouse (*Centrocercus urophasianus*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*). Burrowing mammals and insects are of particular concern at this facility. In the past, studies have been performed near and on this facility for species including: Townsend's ground squirrel (*Spermophilus townsendii*), Ord's kangaroo rat (*Dipodomys ordii*), montane vole (*Microtus montanus*), and the deer mouse (*Peromyscus maniculatus*). However, no areas of critical habitat, as defined in 40 CFR 300, are known to exist at or near the RWMC. See the Subsurface Disposal Area (SDA) risk assessment for a more thorough discussion (INEEL 2002).

1.3.2.2 Contaminants of Potential Concern—Radioactive Waste Management Complex. Solid and liquid radioactive, metal, and chemical wastes have been buried in trenches and pits at the Subsurface Disposal Area at the RWMC since 1952. About 550 Ci of Pu-238, 21,000 Ci of Pu-239, 4,900 Ci of Pu-240, 165,000 Ci of Pu-241, and 51,000 Ci of Am-241 were buried in the trenches between 1954 and 1970. An estimated 334,630 L (88,400 gal) of other waste were buried before 1970, including about 92,364 L (24,400 gal) of carbon tetrachloride; 147,631 L (39,000 gal) of lubricating oil; and about 94,635 L (25,000 gal) of other organic compounds, including 1,1,1-trichoroethane, trichloroethylene, perchloroethylene, toluene, and benzene. Before 1970, little or no sediment was retained between the evacuation bottoms and the underlying basalt. After 1970, a layer of sediment was added to inhibit downward migration of waste constituents.

The *Ancillary Basis for Risk Analysis of the Subsurface Disposal Area* (INEEL 2002) indicates that cadmium, lead, nitrate, Am-241, Pu-239, Pu-240, and Sr-90 are the primary COPCs for this area. Additionally, the ecological risk assessment in this document states that mercury, beryllium, and Nb-94 were also shown by the modeling to be increasing with time and were included as potential COPCs (particularly to establish a baseline for future monitoring). The organics, 1,1,1-trichloroethane (and its degradation products) and carbon tetrachloride are also included as COPCs. The carbon tetrachloride

could not be assessed for ecological receptors due to lack of toxicity data and 1,1,1-trichloroethane was poorly represented for assessment by one toxicity value (DOE-ID 1999). The data collected in 2006 will help determine whether significant adverse effects to plants and wildlife are occurring. See Table 1-3 for the required quantitation limits.

1.3.2.3 Probable Transport Pathways—Radioactive Waste Management Complex. See Subsection 1.3.1.3 and Section 6 of *Ancillary Basis for Risk Analysis of the Subsurface Disposal Area* (INEEL 2002).

1.3.2.4 Selection of Sampling Locations—Radioactive Waste Management Complex. The areas outside the RWMC facility fence were gridded off into 100 × 100-m (110 × 110-yd) plots. Then 10 plots were randomly selected for sampling but selected plots were subsequently moved to ensure that areas of concern were addressed (Figure 1-3).

1.3.3 Materials and Fuels Complex

The Materials and Fuels Complex (MFC) (formerly Argonne National Laboratory-West [ANL-W]) is located about 50 km (30 mi) west of Idaho Falls in the southeastern part of the INL Site, and covers about 360 hectares (890 acres). For the past 50 years, the MFC has led the nation in the development of advanced nuclear reactor technology. Breakthroughs in the type of fuel used in nuclear-generated power, improved fuel disposition technologies, and the proven demonstration of an inherently safe nuclear power plant have all been developed at the MFC.

The MFC currently houses extensive support facilities for three major reactors: Transient Reactor Test Facility (TREAT), Experimental Breeder Reactor II (EBR-II), and the Zero Power Physics Reactor (ZPPR). Built in 1959, TREAT was the first reactor to operate at the ANL-W site. TREAT is now used mainly for safety tests for various fuel types as well as for nonreactor experiments. The EBR-II, which went into operation in 1964, is a pool-type, sodium-cooled reactor. It was provided with its own Fuel Cycle Facility (FCF) adjacent to the reactor building for remote reprocessing and refabrication of reactor fuel. The FCF operated from 1964 providing five complete core loadings of recycled fuel for EBR-II. The ZPPR was put into operation in 1969 and was placed in standby in 1992.

1.3.3.1 Environmental Setting—Materials and Fuels Complex. The MFC is within a local topographically closed basin. The aspect is generally flat, with the terrain gradually sloping up toward the East and Middle buttes southwest of MFC. Vegetation in the area consists predominantly of sagebrush and crested wheatgrass, with lesser amounts of other shrubs, grasses, and forbs. The surrounding areas provide relatively continuous stretches of good sagebrush habitat both on and off lava.

The sagebrush/rabbitbrush and salt desert shrub habitats in the area support a number of species, including sage grouse and pronghorn. The western meadowlark (*Sturnella neglecta)* and mule deer (a game species) are supported by the grasslands habitat. However, no areas of critical habitat, as defined in 40 CFR 300, are known to exist in or around the MFC.

1.3.3.2 Contaminants of Potential Concern—Materials and Fuels Complex. The MFC site includes a number of research and support facilities that contributed to the total volume of waste generated These facilities in the past generated radioactive low-level waste, radioactive transuranic waste, hazardous waste, mixed waste, sanitary waste, and industrial waste. As shown in Table 1-2, COPCs include radionuclides (Cs-137) and metals (chromium, mercury, zinc, and silver). These contaminants originated from historical use of industrial water treatment chemicals and photographic process discharges. The data collected will help determine whether significant adverse effects to plants and wildlife are occurring. See Table 1-3 for the required quantitation limits.

Table 1-3. Analytes, required quantitation levels, and analytical method.

Analyte[a]	Requested Quantitation Limit: Soils (mg/kg, µg/kg, or pCi/g)	Requested Quantitation Limit: Biota (mg/kg, µg/kg or pCi/g)	Requested Quantitation Limit: Water (µg/L or pCi/L)	Proposed Method
Inorganics[b,c]				
Antimony	0.06	0.005	1.2	SW-846
Arsenic	0.7	0.03	5.0	SW-846
Barium	20.0	2.0	100.0	SW-846
Beryllium	0.5	0.05	5.0	SW-846
Cadmium	0.09	0.005	1.0	SW-846
Chromium	0.4	0.15	2.0	SW-846
Cobalt	5.0	0.01	50.0	SW-846
Copper	0.6	2.0	1.0	SW-846
Lead	0.3	0.05	1.0	SW-846
Manganese	1.5	1.5	10.0	SW-846
Mercury	0.01	0.01	0.1	SW-846
Nickel	4.0	0.5	20.0	SW-846
Selenium	0.035	0.01	3.0	SW-846
Silver	0.13	0.005	1.0	SW-846
Strontium	2.0	2.0	0.2	SW-846
Thallium	0.1	0.002	0.4	SW-846
Vanadium	5.0	0.09	40.0	SW-846
Zinc	2.0	2.0	20.0	SW-846
Nitrate	5	NA	NA	EPA-300
Organics				
Carbon tetrachloride	10	10	NA	SW-846-8260B
1,1,1-trichloroethane and degradation products	10	10	NA	SW-846-8260B
Radionuclides[c]				
Gamma emitters[d]	0.1	0.1	0.1	Gamma spectrometry
Am-241	0.05	0.05	0.2	Alpha spectroscopy
Cs-134 and -137	<0.1	<0.1	<30	Gamma spectroscopy
Co-60	<0.1	<0.1	<30	Gamma spectroscopy
Eu-152, -154, and -155	<0.1	<0.1	<30	Gamma spectroscopy
Nb-94				Gamma spectroscopy
Pu-238, -239, and -239/240	0.05	0.05	0.2	Alpha spectroscopy
Sr-90	0.5	0.5	1.0	Gas flow proportional counting
U-234 and -238	0.05	0.05	0.5	Alpha spectroscopy

Table 1-3. (continued).

Analyte[a]	Requested Quantitation Limit: Soils (mg/kg, µg/kg, or pCi/g)	Requested Quantitation Limit: Biota (mg/kg, µg/kg or pCi/g)	Requested Quantitation Limit: Water (µg/L or pCi/L)	Proposed Method
Explosives[c]				
TNT	0.08	0.08	N/A	SW-846 8330
RDX	0.08	0.08	N/A	SW-846 8330
HMX	0.08	0.08	N/A	SW-846 8330
2,4-dinitrotoluene	0.08	0.08	N/A	SW-846 8330
2,6-dinitrotoluene	0.08	0.08	N/A	SW-846 8330
2-amino-4,6-dinitrotoluene	0.08	0.08	N/A	SW-846 8330
4-amino-2,6-dinitrotoluene	0.08	0.08	N/A	SW-846 8330

a. Required detection limits for all analytes may be elevated if dilutions are needed due to matrix interferences.
b. High mineral concentrations and matrix complexity could cause dilutions to minimize interelement or matrix interference for metals analysis. Detection limits could be compromised if dilutions are needed.
c. Double volume is needed for laboratory quality control on radiochemistry parameters, and triple volume is needed for metals and radionuclides (increased volume is required for one sample per 20 samples).
d. Limited sample size or low density for matrixes other than soils could cause elevated detection limits for gamma spectrometry.

HMX = high melting explosive

RDX = research development explosive

TNT = trinitrotoluene

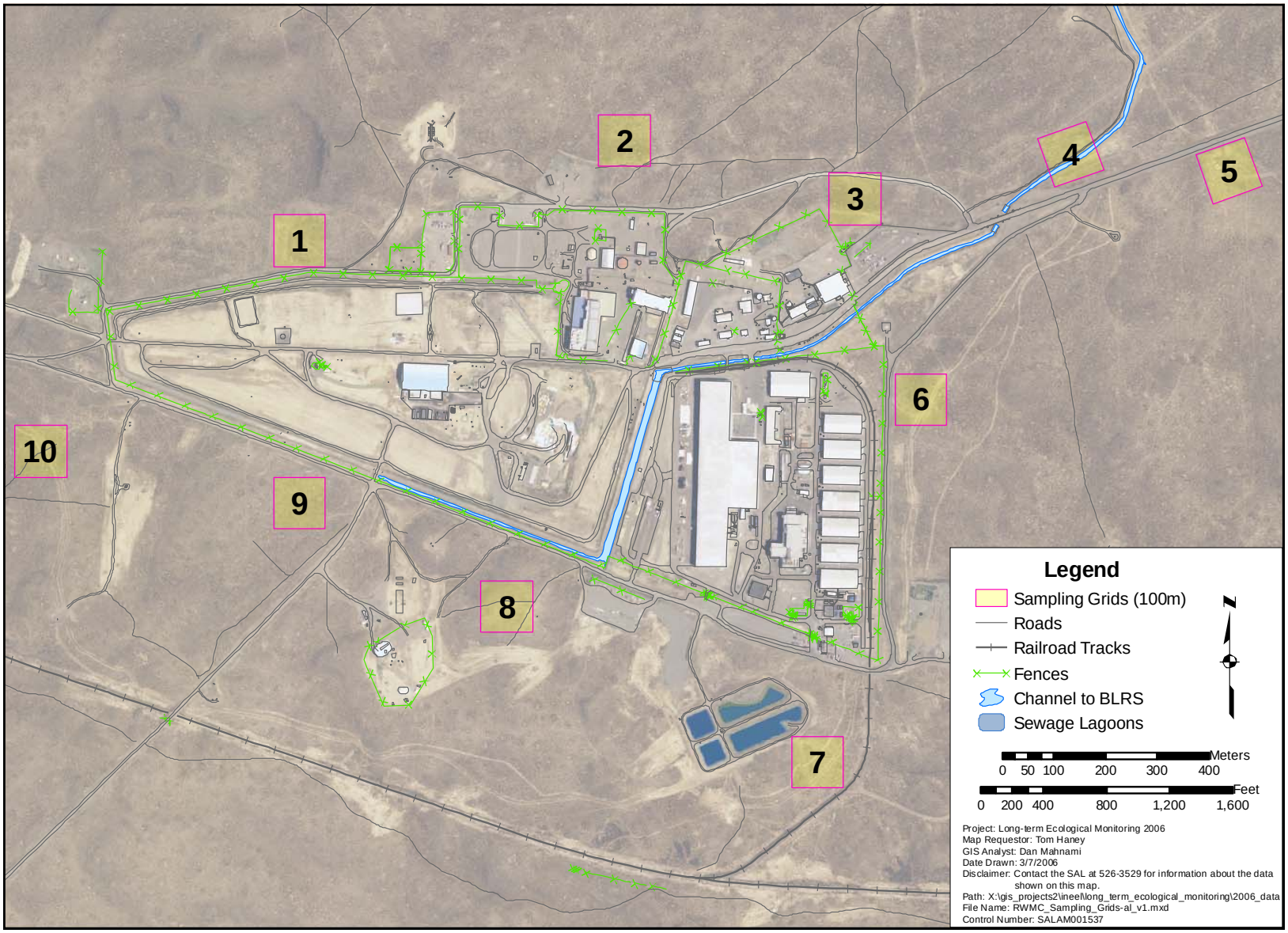

Figure 1-3. Map of the RWMC showing randomly selected sampling grids.

1.3.3.3 Probable Transport Pathways—Materials and Fuels Complex.

Transport pathways for MFC are similar to those indicated in Subsection 1.3.1.3 for CFA.

1.3.3.4 Selection of Sampling Locations—Materials and Fuels Complex.

Locations at the MFC that have good habitat and possible contamination, but are not too disturbed by roads or other facility activities, were gridded into 100 × 100-m (110 × 110-yd) plots. Then 10 plots were chosen for sampling (Figure 1-4).

1.3.4 Industrial Waste Pond and Three Cooling Tower Blowdown Ditches (ANL-01)

The Industrial Waste Pond (IWP) was an unlined, approximately 1.2-ha (3-acre) evaporative seepage pond fed by the Interceptor Canal (IC) and site drainage ditches. The pond was excavated in 1959, with a maximum water depth of about 4 m (13 ft), and was still in use before remediation. This pond received waste from various sources throughout its history. The IWP is an unlined impoundment with a surface area of approximately 1.2 ha (3 acres) and a maximum depth of 3 m (10 ft). It was excavated in 1959 primarily to receive EBR-ll cooling tower blowdown water. Cooling tower blowdown was discharged to the IWP via the IC from the early 1960s to 1975. For a brief period in 1975–1976, cooling tower blowdown was discharged to Ditch B, and between 1976 and 1978, entered the IWP via Ditch C. From 1978 to 1996, the cooling tower effluent was discharged to the IWP by way of the Main Cooling Tower Blowdown Ditch. From 1996 to 2002, the IWP remained operational as a conduit for surface water runoff as well as operational discharges. Because of the physical separation of these ditches to the pond, each ditch (A, B, and C) and the IWP were addressed separately for risk evaluation. Soil and sediment samples were collected from the IWP as part of four different investigations occurring from 1986 to 1994. Cesium-137 was identified as a human health risk factor while trivalent chromium, mercury, selenium, and zinc were identified as ecological risk factors (Lee et al. 1997).

The IWP was identified in the 1998 OU 9-04 ROD (INEEL 1998) as a site requiring further action. The primary remedy of phytoremediation was selected with a contingent remedy of excavation and disposal. At the time the ROD was finalized, the IWP was still in use as part of the Sodium Process Facility. The Sodium Process Facility was clean closed under RCRA in summer 2002. The IWP was deemed ready to be addressed in accordance with the OU 9-04 ROD. Results from the bench scale study as well as the 2- and 4-year sampling efforts at other similarly contaminated sites suggested that the inorganic contaminants in the IWP were not conducive to phytoremediation and that contaminant levels would not be reduced to acceptable levels within an acceptable timeframe. The contingent remedy of excavation and disposal was selected for the IWP; no attempt at phytoremediation was made and 994 m^3 (1,300 yd^3) of contaminated soil was excavated from the IWP in September 2004. However, post-remedial confirmation soil samples collected from the IWP in 2004 showed elevated concentrations of contaminants exceeding the remediation goal in the northwest portion of the IWP (Portage 2005a). An additional 107 m^3 (140 yd^3) of contaminated soil was excavated from the northwest portion of the IWP in November 2004. Soils were removed until the underlying basalt layer was encountered in an area encompassing the “hot spot” (i.e., soils were excavated to surrounding sampling locations, which previous sample results showed met the established remedial goals) (Portage 2005b).

Currently, the IWP remains under institutional controls due to the levels of Cs-137. The industrial waste pond was seeded in the fall of 2004; however, the IC was not revegetated, because it is still used to convey rain and snowmelt from south of the MFC to the industrial waste pond (DOE-ID 2005a). At some point during the summer of 2006, the stormwater and industrial water will start being directed back to the IWP. It is anticipated that in the future, cattails and reeds will be present.

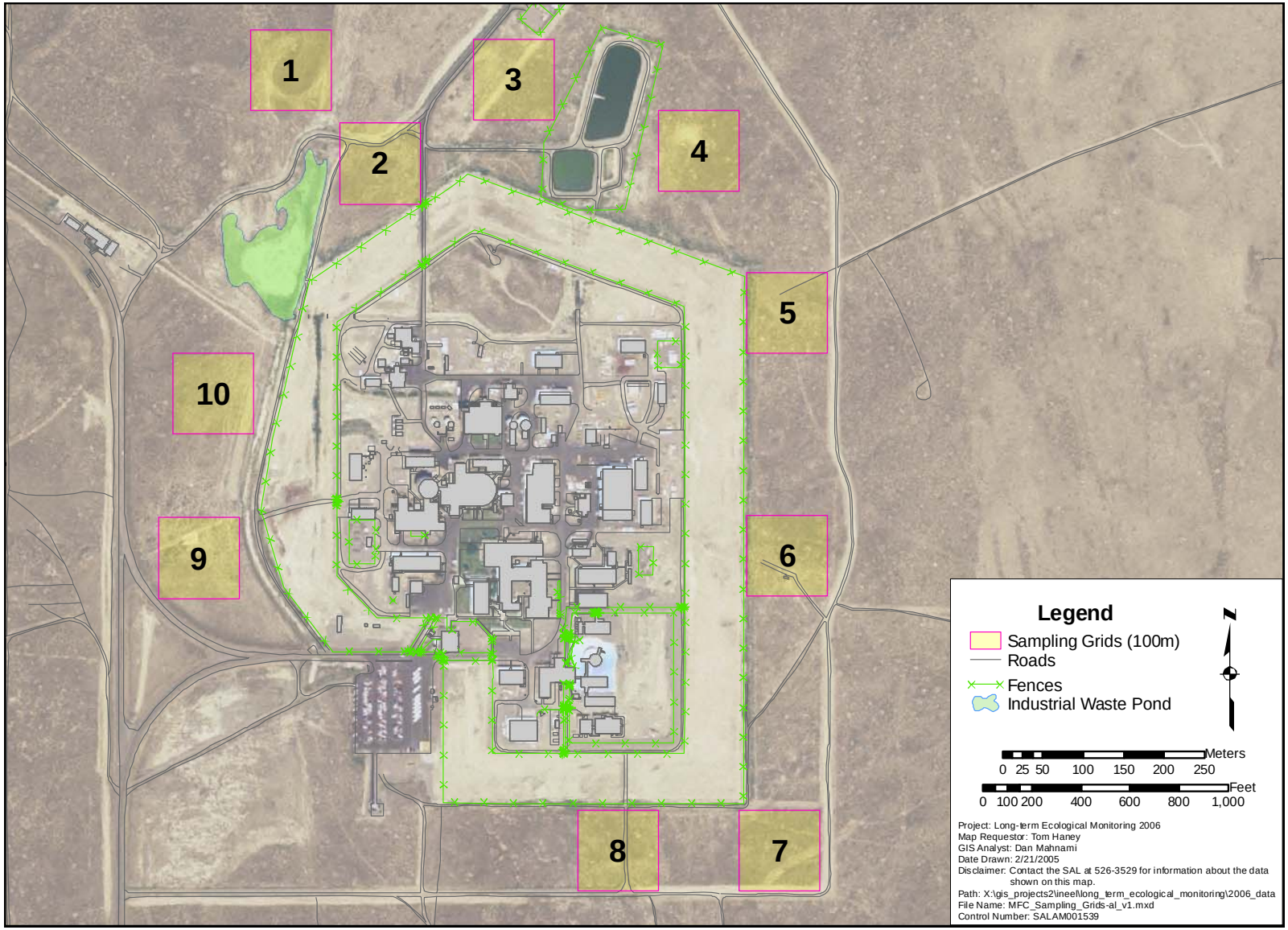

Figure 1-4. Map showing the location of the sampling grids.

1.3.4.1 Environmental Setting—ANL-01. The IWP is located outside the fenced area, northwest of the facility, while the industrial ditches are located both inside and outside the facility fences. The IWP and the associate ditches supported wetland species including bulrush (*Scirpus acutus*) and cattails (*Typha latifolia*) in the past. It was mapped as part of the Fish and Wildlife Service National Wetlands Inventory (Hampton et al. 1995). In the 1970s and 80s, a number of studies were conducted citing waterfowl and other wildlife use of this area. A lava cave frequented by bats is located approximately one mile from the assessment boundary, which could mean that bats also frequent the pond.

The current remediation and seeding of this pond and some of the associated ditches may require that sampling be performed from the ditches. Although this pond is now in a post-remediation state, it will provide information to determine the concentrations in the water and pond, as well as the associated ditches, as a baseline.

1.3.4.2 Contaminants of Potential Concern—IWP ANL-01. Potential contaminants of ecological concern at the IWP include the following:

- Metals (especially cadmium, chromium, and mercury in the sediments)
- Radionuclides (gamma).

For ecological receptors, the data collected will help determine whether significant adverse effects to plants and wildlife are occurring. See Table 1-3 for the required quantitation limits.

1.3.4.3 Probable Transport Pathways—IWP ANL-01. Contaminants at the IWP and the associated ditches could affect animals through skin contact, inhalation, ingestion, and external exposure. Animals could ingest contaminants during drinking. Invertebrates in direct contact with contaminated water or sediments could bioaccumulate contaminants. Animals could then be exposed indirectly by eating plants or animals that have absorbed or adsorbed contaminants. During high winds, animals could inhale and ingest particulates.

1.3.5 Terrestrial Reference Area

The reference area locations were selected by considering soil type, disturbance, and habitat type. These types of information are critical when interpreting the population data. Sagebrush steppe dominates the potentially impacted areas, so the reference area habitat type matches the potentially impacted area's habitat type to the greatest extent possible. Figure 1-1 shows the reference area locations. The reference areas were selected from the proposed region where these three variables most closely match the potentially contaminated sites. Five sampling plots were randomly selected at each reference area location. The locations were surveyed using a global positioning system unit and are shown in Figures 1-5 and 1-6.

1.3.6 Aquatic Reference Area

Chilly Slough, a marshy area located upstream from Mackay Reservoir, is the aquatic reference area. It is outside the known INL Site contamination plume and should have negligible impact from the INL (Figure 1-7). Five sampling locations in the same area that was sampled in 2005 will be selected based on the presence of water and/or aquatic plants.

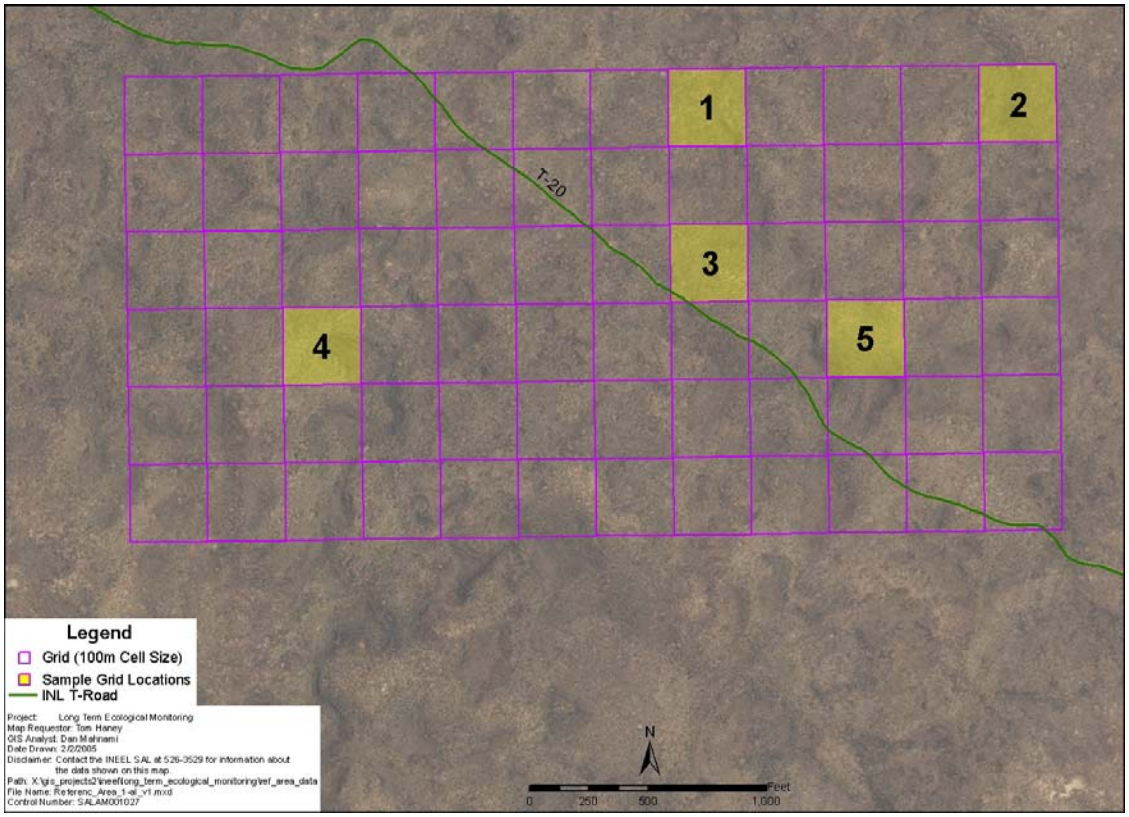

Figure 1-5. Map showing the location of Terrestrial Reference Area 1.

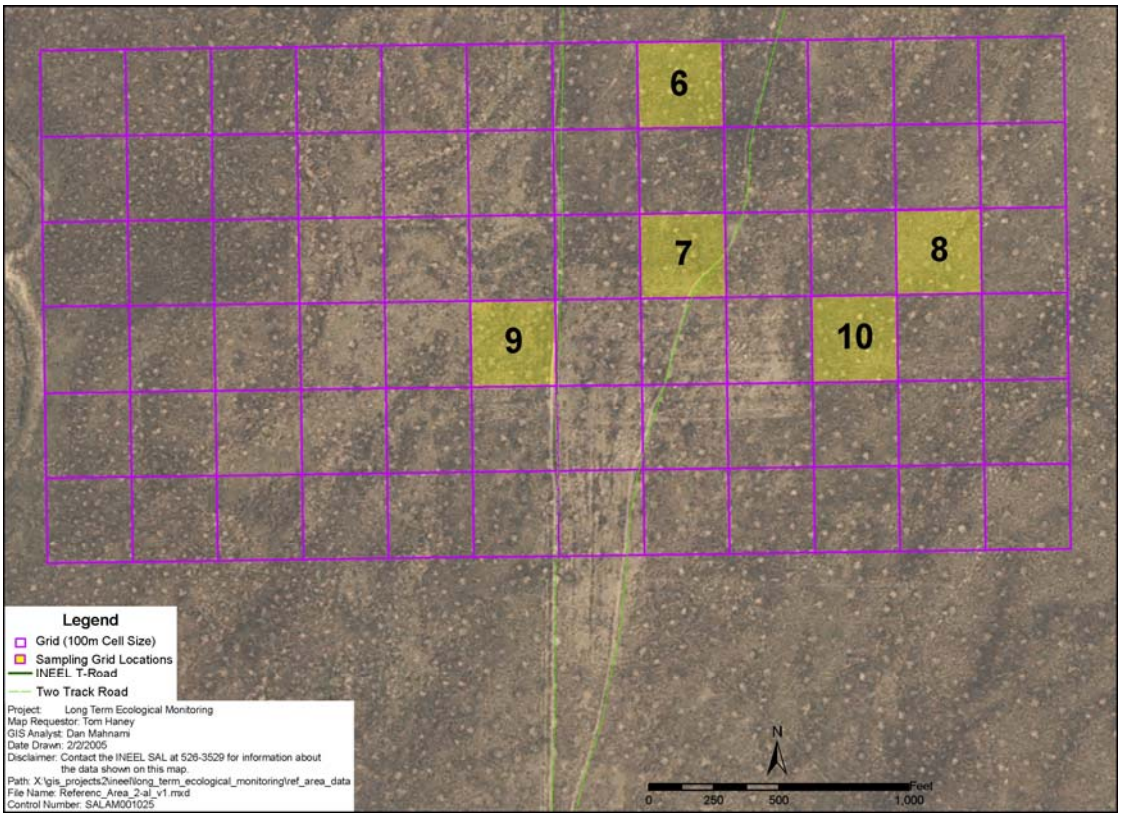

Figure 1-6. Map showing the location of Terrestrial Reference Area 2.

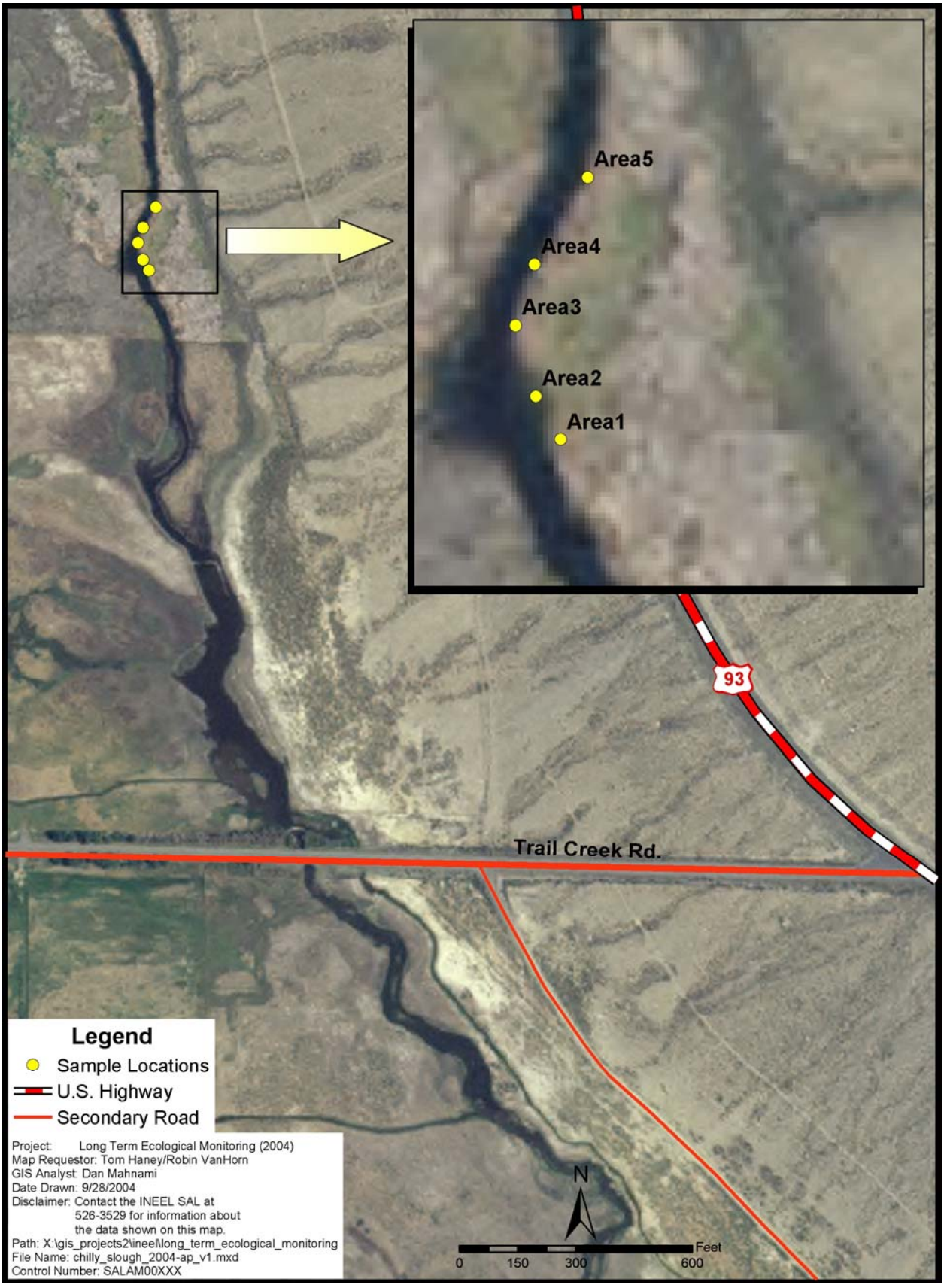

Figure 1-7. Map showing the location of the Chilly Slough, the aquatic reference area.

2. PROJECT ORGANIZATION AND RESPONSIBILITIES

The following subsections contain descriptions of the personnel associated with this FSP. Table 2-1 contains key personnel assignments and contact information. These responsibilities may change throughout the sampling effort. A logbook entry will be made to show the name of the individual performing the function.

Table 2-1. Proposed personnel and job assignments.

Assignment	Name	Phone
Work Package Manager	Tom Haney	208-526-9407
Technical Lead	Robin VanHorn	208-526-1650
Field Team Leaders	Thomas Haney/Robin VanHorn	208-526-9407/208-526-1650
Health and Safety Officer	Lawrence (Mic) McManamon	208-526-3658
Samplers	TBD	TBD
Waste Generator Services	Blair Willis	208-526-5217
Sample and Analysis Management Program	Lala Chambers	208-526-4854
ESH&QA	Robert Hendrickson	208-526-5333
Project Manager	Doug Burns	208-526-7472
Miscellaneous Sites Operations Manager	Martin Doornbos	208-526-0676

2.1 Work Package Manager

The work package manager is responsible for the overall work scope, schedule, and budget. The work package manager ensures that the project complies with INL Site management control procedures (MCPs) and program requirements documents (PRDs), as well as all applicable requirements of the Occupational Safety and Health Administration, U.S. Environmental Protection Agency (EPA), DOE, U.S. Department of Transportation, and State of Idaho. The work package manager works with all other identified project personnel to accomplish day-to-day operations, identify and obtain additional resources needed at the job site, and interact with environmental, safety, health, and quality assurance (ESH&QA) oversight personnel on matters regarding health and safety. Along with the technical lead, the work package manager ensures that work is scheduled in facility plan-of-the-week, discussed in POD meetings, and authorized by the Miscellaneous Sites Operations Manager.

2.2 Technical Lead

The technical lead is responsible for field activities and for all personnel, including craft personnel, assigned to work at the project location. The technical lead is the interface between operations and project personnel and works to ensure that the sampling team achieves the project's objectives in a safe and efficient manner. The technical lead coordinates all document preparation, field and laboratory activities, data evaluation, risk assessment, dose assessment, and design activities.

2.3 Field Team Leaders

The field team leaders (FTLs) is the ICP representative at the job site, with responsibility for safe and successful data collection. The FTL acts as the team leader and works with ICP facility personnel, ESH&QA personnel, and the field sampling team to manage field-sampling operations and to execute the characterization plan. The FTL enforces site control, documents activities, and may conduct the daily safety briefings at the start of the shift. Health and safety issues may be brought to the FTL's attention.

If the FTL leaves the job site during sampling operations, an alternate is appointed to act as the FTL. The identity of the acting FTL is conveyed to sampling personnel at the sampling location, recorded in the logbook, and communicated to the facility representative (when appropriate).

2.4 Health and Safety Officer

The health and safety officer (HSO) is located at the work site and is the primary contact for health and safety issues. The HSO assists the FTL in all aspects of health and safety, including complying with the enhanced work planning process. The HSO is authorized (as is any employee) to stop work at the site if any operation threatens workers or public health and safety. The HSO may be assigned other responsibilities, as stated in other sections of the project job safety analysis (JSA), as long as they do not interfere with the primary responsibilities stated here. The HSO is authorized to verify compliance with the JSA, conduct inspections, monitor decontamination procedures, and require and monitor corrective actions, as appropriate. Other ESH&QA personnel at the work site (i.e., safety coordinator, industrial hygienist, radiological control technician [RCT], radiological engineer, environmental compliance coordinator, and facility representative[s]) may support the HSO, as necessary.

The HSO, or alternate, must be qualified (in accordance with the Occupational Safety and Health Act definition (29 USC § 654(a) (1)) to recognize and evaluate hazards and is given authority to take or direct actions to ensure that workers are protected. The HSO may also be the industrial hygienist, safety coordinator, or, in some cases, the FTL (depending on the hazards, complexity and size of the activity involved, and required concurrence from the ICP ESH&QA manager) at the work site. But other task-site responsibilities must not conflict (philosophically or in terms of significant added volume of work) with the role of the HSO at the work site.

If it is necessary for the HSO to leave the work site, then the HSO will appoint an alternate to fulfill this role. The identity of the acting HSO will be recorded in the FTL logbook, and work-site personnel will be notified.

2.5 Samplers

Samplers include all task-site personnel assigned to the characterization project to obtain samples for analytical purposes. All samplers (including ICP, DOE, and subcontractor personnel) must understand and comply with the requirements of this document and other applicable documentation such as sampling procedures. The FTL/JSS will brief the sampling personnel at the start of each shift regarding the tasks to be performed and the applicable health and safety requirements. Work tasks, associated hazards, engineering and administrative controls, required personal protective equipment (PPE), work control documents, and radiological and emergency conditions are discussed during the prejob briefing.

Samplers are responsible for identifying any potentially unsafe situation or condition to the FTL/JSS and applicable ESH&QA representatives for corrective action. If it is perceived that an unsafe condition poses imminent danger, sampling personnel are authorized to stop work immediately and notify the FTL/JSS of the unsafe condition.

2.6 Waste Generator Services Waste Technical Specialist

The INL Site Waste Generator Services (WGS) waste technical specialist ensures that waste disposal complies with approved INL Site waste management procedures. The WGS personnel have the responsibility to help solve waste management issues at the task site. In addition, WGS personnel prepare the appropriate documentation for waste disposal and make the proper notifications, as required. All waste is disposed of using approved INL Site procedures in accordance with PRD-5030, "Environmental Requirements for Facilities, Processes, Materials, and Equipment."

2.7 Sample and Analysis Management Program

The Sample and Analysis Management (SAM) Program is responsible for helping to define the analyses that will meet project requirements, generating the sampling and analysis plan table and field guidance form, and generating and issuing sample labels. The SAM Program determines the laboratory that will provide analytical services based on established policies and contracts, and prepares the statement of work. The SAM Program also tracks analytical progress and performs a cursory review of the final data packages. The SAM representative obtains data validation as directed by the project.

2.8 Environmental, Safety, Health, and Quality Assurance Support

The ESH&QA personnel are assigned to the job site to provide resources and expertise to resolve ESH&QA issues. Personnel assigned to provide ESH&QA support must be qualified to recognize and evaluate hazards, environmental concerns, or quality issues according to his or her expertise and are given the authority to take or direct immediate actions to ensure compliance and protection. In addition, ESH&QA personnel assess and ensure compliance with applicable ICP procedures, including this document.

Radiological control support personnel are the source for information and guidance on radiological hazards at the job site. Radiological support personnel may include the radiological control supervisor, RCTs, and radiological engineers. The RCT is responsible for surveying the task site, equipment, and samples, and for providing guidance on work activities in accordance with PRD-183, "Radiological Control Manual." The radiological engineer provides information and guidance relative to the evaluation and control of radioactive hazards at the job site, including performing radiation exposure estimates and as-low-as–reasonably-achievable evaluations, identifying the type(s) of radiological monitoring equipment necessary for the work, and advising personnel of changes in monitoring and PPE.

2.9 Project Manager

The project manager is responsible for setting the mission, vision, direction, and strategy for projects to ensure implementation of ICP objectives. The project manager defines the scope and priority, and requests the funding to accomplish projects in a safe, secure, cost-effective, and compliant manner; aligns the project organization and establishes a work culture consistent with the ICP mission, vision, and strategy; ensures—as line management—that work is performed in a safe, secure, cost-effective, and compliant manner; and completes project activities within the project scope, schedule, and budget.

2.10 Miscellaneous Sites Operations Manager

The miscellaneous sites operations manager responsibilities, as they relate to this project, include authorizing the execution of work scheduled in facility plan-of-the-week and POD meetings.

3. DATA QUALITY OBJECTIVES

The EPA-developed data quality objective (DQO) process (EPA 2000) helps ensure that the type, quantity, and quality of data used in decision-making are appropriate for the intended application. The DQOs presented in this FSP are consistent with, but are not identical to, those presented in the LTEM Plan (INEEL 2004). These DQOs correspond to the field sampling activities planned for 2006, whereas the LTEM Plan has a broader, long-term focus. The DQOs for 2006 are summarized in Table 3-1.

Table 3-1. Data quality objectives for 2006 long-term ecological monitoring.

Problem Statement	The objective of sampling at each area of concern identified in the LTEM plan (INEEL 2004) is to evaluate contamination and potential ecological effects as compared with reference areas.
Decision Statement (DS)	**DS-1:** Determine whether onsite contaminant concentrations in either biotic or abiotic media are elevated relative to the reference areas and whether ecological effects have occurred. **Alternative Action (AA)-1:** Site-related contaminants are elevated and effects are evident relative to the reference areas. Evaluate whether correlations or associations exist between contaminants and effects to determine the need for additional associated studies, as discussed in the LTEM plan (INEEL 2004). **AA-2:** Site-related contaminants are elevated, but effects are not evident relative to the reference areas. Evaluate additional associated studies as discussed in the LTEM plan to detect effects based on those contaminants identified as elevated. **AA-3:** Site-related contaminants are not elevated, but effects are evident relative to the reference areas. Evaluate whether additional contaminants are present. **AA-4:** Site-related contaminants are not elevated, and no effects are evident relative to the reference areas. Continue monitoring at an appropriate level to support trending, ensuring the remedy remains ecologically protective, and five-year reviews.
Inputs to the Decision	Characterization of contaminant concentrations: • Contaminant concentrations in soils collocated with vegetation • Contaminant concentrations in vegetation • Contaminant concentrations in deer mice collocated with soil and vegetation samples • Contaminant concentrations in receptors collocated with sediment and surface water samples. Characterization of effects: • Vegetation community structure, plant bioassay • Invertebrate community structure, invertebrate bioassay • Mammal community structure, organ and body weights, histopathology, genetic analysis • Avian community structure • Avian egg count, hatching success, fledgling count, fledgling body weight • Soil, physical, and nutrient characteristics.
Study Area Boundary	Areas to be sampled during 2006 include the CFA, RWMC, MFC, IWP and ditches, the terrestrial reference area, and the offsite aquatic reference area. A series of 100 × 100-m (110 × 110-yd) grids will be sampled. Sampling will be conducted in each plot so that samples are temporally and spatially collocated. Soil, plant, and small mammal samples will be collected from all locations.

Table 3-1. (continued).

Decision Rules	If analyte concentrations in any media exceed those at the reference areas ($p < 0.05$ or other appropriate background evaluation), then determine whether a correlation exists between contaminants and effects and whether additional associated studies are needed as discussed in the LTEM Plan (INEEL 2004). If site-related contaminant concentrations are significantly elevated compared to the reference area but no effects are apparent relative to the reference areas based on data evaluations, then evaluate the need for additional associated studies, as discussed in the LTEM Plan, to detect effects based on those contaminants identified as elevated. If site-related contaminant concentrations are not significantly elevated compared to the reference area, but effects are evident relative to the reference areas based on an evaluation of the data, then identify additional sampling requirements to evaluate whether additional contaminants are present. No further sampling will be performed if effects are determined to be related to physical disturbance, such as soil compaction or removal of topsoil. If site-related contaminant concentrations are not significantly elevated and no effects are evident relative to the reference areas based on an evaluation of the data, then perform monitoring at an appropriate level for trending, ensuring the remedy remains ecologically protective and supporting five-year reviews.
Specify Tolerable Limits on Decision Errors	Analyte concentrations can range from below detection limits to well above reference area concentrations. Because the study design is based on professional judgment and the sample size is fixed at 10 random locations, preset limits on the decision error are not applicable. Statistics will be applied to evaluate trends. Error analysis will be carried out when feasible. The data are being collected for long-term needs that cannot be quantified at this point. The limits on decision errors are used to determine sample size, which in this case was based on expert knowledge to maximize resources.
Optimize the Sampling Design	The sampling design focuses on areas near the facilities most likely to be impacted by contamination. If elevated concentrations in various media are not found close to the facility, it is unlikely they would be found farther away.

4. SAMPLE COLLECTION, ANALYSIS, AND DATA MANAGEMENT

4.1 Sample Collection

4.1.1 Presampling Meeting

Before sampling takes place, project personnel will meet to ensure that sampling can be performed in a safe and compliant manner that will result in usable data. Project personnel also ensure that all necessary equipment and documentation are present and all personnel understand the project scope, objectives, hazards, and hazard controls.

4.1.2 Sampling and Analysis Requirements

Tables 4-1 through 4-7 provide general summaries of the areas to be sampled, analytes, sample depths and types, and the number of samples for the major analyses. Appendix A includes the sampling and analysis plan tables and the field guidance forms that together include all sample descriptions, locations, analysis types, quantities, containers, holding times, and preservative requirements that apply to samples being collected under this FSP.

Table 4-1. Composite biotic and collocated soil samples at the RWMC for analytical assessment.

Analytes	Sample Depth	Sample Media	Sample Type	Number of Samples
Metals (Target Analyte List [TAL]) (Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn)	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot	10
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot	10
	NA	Deer mice	Composite of five to 10 animals/plot	10
	NA	Sagebrush	Composite of greater than five plants/plot	10
	NA	Crested wheatgrass[a]	Composite of greater than five plants/plot	10
Nitrates[b]	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot	10
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot	10
Radionuclides (Am-241, gamma spec., Pu-iso, U-iso, Nb-94, Sr-90)	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot	10
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot	10
	NA	Deer mice	Composite of five to 10 animals/plot (use the deer mice collected for the selected metals sampling)	See above
	NA	Sagebrush	Composite of greater than five plants/plot	10
	NA	Crested wheatgrass[a]	Composite of greater than five plants/plot	10

Table 4-1. (continued).

Analytes	Sample Depth	Sample Media	Sample Type	Number of Samples
Volatile Organic Compounds (1,1,1,-trichoroethane, carbon tetrachloride)	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five per plot	10
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—5 cores/plot	10
	NA	Deer mice	Composite of 5 to 10 animals/plot	See above
	NA	Sagebrush	Composite of greater than 5 plants/plot	10
	NA	Crested wheatgrass[a]	Composite of greater than 5 plants/plot	10

a. Or other wheatgrass.
b. Nitrates will not be evaluated for in biotic tissue.

Table 4-2. Composite biotic and collocated soil samples at the CFA for analytical assessment.

Analytes	Sample Depth	Sample Media	Sample Type	Number of Samples
Metals (Target Analyte List [TAL]) (Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn)	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot	10
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot	10
	NA	Deer mice	Composite of five to 10 animals/plot	10
	NA	Sagebrush	Composite of greater than five plants/plot	10
	NA	Crested wheatgrass[a]	Composite of greater than five plants/plot	10
Radionuclides (Gamma only)	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot/ for puck analysis	10
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot/ for puck analysis	10
	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot/for laboratory analysis	2
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot/for laboratory analysis	2
	NA	Deer mice	Composite of five to 10 animals/plot (use the deer mice collected for the selected metals sampling)	See above
	NA	Sagebrush	Composite of greater than five plants/plot	10
	NA	Crested wheatgrass[a]	Composite of greater than five plants/plot	10

Table 4-2. (continued).

Analytes	Sample Depth	Sample Media	Sample Type	Number of Samples
Nitroaromatics[b]	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot	1
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot	1
	NA	Deer mice	Composite of five to 10 animals/plot	1
	NA	Sagebrush	Composite of greater than five plants/plot	1
	NA	Crested wheatgrass[a]	Composite of greater than five plants/plot	1

a. Or other wheatgrass.
b. Nitroaromatics should be collected for all media at Plot 3.

Table 4-3. Composite biotic and collocated soil samples at the MFC and the reference areas for analytical assessment.

Analytes	Sample Depth	Sample Media	Sample Type	Number of Samples
Metals (Target Analyte List [TAL]) (Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn)	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot	20
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot	20
	NA	Deer mice	Composite of five to 10 animals/plot	20
	NA	Sagebrush	Composite of greater than five plants/plot	20
	NA	Crested wheatgrass[a]	Composite of greater than five plants/plot	20
Radionuclides (gamma spec)	0 to 5 cm (0 to 2 in.)	Soil	Surface composite—five subsamples/plot	20
	5 to 61 cm (2 to 24 in.)	Soil	Subsurface composite—five cores/plot	20
	NA	Deer mice	Composite of five to 10 animals/plot (use the deer mice collected for the selected metals sampling)	See above
	NA	Sagebrush	Composite of greater than five plants/plot	20
	NA	Crested wheatgrass[a]	Composite of greater than five plants/plot	20

a. Or other wheatgrass.

Table 4-4. Biotic samples at CFA, the RWMC, and the MFC for effects analysis.

Assessment	Sample Depth	Sample Media	Sample Type	Number of Samples
Kidney and liver to body weight ratio	NA	Deer mice	Five animals/plot (use deer mice collected for the analytical sampling)	150
Liver/kidney histopathology	NA	Deer mice	Five animals/plot (use deer mice collected for the analytical sampling)	150
Earthworm/seedling toxicity testing	0 to 30 cm (0 to 1 ft)	Soil	Composite from five subplots at each plot	30
Soil fauna	3 cm (1 in.)	Soil	One per plot, 3-in.-diameter × 1.5-in.-deep sample under sagebrush and duplicate	30
Avian population	NA	Birds	10 point count locations sampled three times	30
Reptile population	NA	Reptiles	Observation	To be determined
Plant population	NA	Plant	50 Daubenmire subplots per plot	1,500
Animal population	NA	Small mammals	100 traps per plot/for six trapping nights (two weeks)	NA

Table 4-5. Composite biotic and collocated samples at the IWP and ditches for analytical assessment.

Analytes	Sample Depth	Sample Media	Sample Type	Number of Samples
Metals (TAL) (Sb, As, Ba, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn)	0 to 15 cm (0 to 6 in.)	Sediment	Grab sample from locations at water's edge	5
	NA	Surface water	Grab sample from locations at water's edge	5
	NA	Aquatic plant (if present)	Composite of 5 plants	5
Radionuclides (gamma spec., Sr-90)	0 to 15 cm (0 to 6 in.)	Sediment	Grab sample from randomly located grid cell	5
	NA	Surface water	Grab sample from randomly located grid cell	5
	NA	Aquatic plant (if present)	Composite of 5 plants	5

Note: No duplicates for biota (in this case frogs or tadpoles if present) will be collected. The laboratory will prepare matrix duplicates from the appropriate digestates.

Table 4-6. Biotic samples at the Terrestrial Reference Area for effects analysis.

Assessment	Sample Depth	Sample Media	Sample Type	Number of Samples
Kidney and liver to body weight ratio	NA	Deer mice	Five animals/plot	50
Liver/kidney histopathology	NA	Deer mice	Five animals/plot	50
Earthworm/seedling toxicity testing	0 to 30 cm (0 to 1 ft)	Soil	Composite from five subplots at each plot	10
Soil fauna	3 cm (1 in.)	Soil	One per plot, 3-in.-diameter × 1.5-in.-deep sample under sagebrush and duplicate	10
Avian population	NA	Birds	10 point count locations sampled three times	30
Reptile population	NA	Reptiles	Observation	To be determined
Plant population	NA	Plant	50 Daubenmire subplots per plot	500
Animal population	NA	Small mammals	100 traps per plot/for six trapping nights (two weeks)	NA

Table 4-7. Biased composite biotic and collocated samples at the Aquatic Reference Area for analytical assessment.

Analytes	Sample Depth	Sample Media	Sample Type	Number of Samples
Metals (TAL) (Sb, As, Ba, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn)	0 to 15 cm (0 to 6 in.)	Sediment	Grab sample from randomly located grid cell	5
	NA	Surface water	Grab sample from randomly located grid cell	5
	NA	Aquatic plant	Composite of five plants	5
Radionuclides (gamma spec., Sr-90)	0 to 15 cm (0 to 6 in.)	Sediment	Grab sample from randomly located grid cell	5
	NA	Surface water	Grab sample from randomly located grid cell	5
	NA	Aquatic plant	Composite of five plants	5

Note: No duplicates for biota will be collected. The laboratory will prepare matrix duplicates from the appropriate digestates.

The SAM Program is responsible for obtaining laboratory services for the required analyses in accordance with ICP-MCP-9439, "Environmental Sampling Activities at the INEEL." The SAM Program will prepare two statements of work (SOWs) for laboratory services: (1) "Radiological Analyses of Samples Collected for the Long-Term Ecological Monitoring for 2006 at the INL" and (2) "Organic, Inorganic, and Miscellaneous Classical Analyses of Samples Collected for the Long-Term Ecological Monitoring for 2006 at the INL." These SOWs will include the analytical methods and the project-required detection limits for each analysis type listed in the sampling and analysis plan tables and field guidance forms (Appendix A). Detection limits for each analysis type are included in Table 1-3.

Samplers coordinate with the SAM and the analytical laboratory to ensure that the samples arrive at the laboratory to meet holding times. Holding times for biota samples are not established; however, approval of holding times of 6 months to 1 year is likely based upon other ecological studies (Marsh et al. 1996). Biotic samples will be preserved by freezing.

When required, quality control samples will be collected. If, for some reason, a sample is lost, containers are broken, or the sample is in some way unusable, then the sample will be retaken. The sampling FTL will ensure that any changes to this document regarding sampling frequency, location, and/or analyses are documented in the sample logbook. The project manager is responsible for ensuring that a Document Request Form (DRF) (Form 412.11) is written and approved for any changes to this document.

A sampling logbook containing a written record for all field data gathered, field observations, field equipment calibrations, samples collected for analysis, and sample custody will be prepared. Field logbooks are legal documents that are maintained to ensure that field activities are documented properly as they relate to site safety meetings and site work being conducted in accordance with the health and safety procedures. Field logbooks are bound and contain consecutively numbered pages. All entries in field logbooks are made using permanent ink pens or markers. The person making corrections to an entry should draw a single line through the entry and then initial and date the correction. Data sheets will be used to collect data about plants and small mammals. The FTL will note the use of data sheets in the appropriate logbook.

4.1.3 Sample Documentation and Management

The FTL controls and maintains all field documents and records and submits required documents to the Administrative Record and Document Control office at the project's end. The appropriate information pertaining to each sample is recorded in accordance with MCP-1194, "Logbook Practices for ER and D&D&D Projects"; MCP-1192, "Chain-of-Custody and Sample Labeling for ER and D&D&D Projects"; and the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Deactivation, Decontamination, and Decommissioning* (DOE-ID 2004). The person designated to complete the sample or FTL logbook records items (such as presampling safety meeting notes, weather, and general project notes) in the logbook as appropriate. Proper handling, management, and disposal of samples under the control of CH2M-WG Idaho, LLC, or its subcontractors are essential. All samples are dispositioned in accordance with the appropriate procedures.

If it becomes necessary to revise project documents, a DRF will be executed in accordance with MCP-233, "Process for Developing, Releasing, and Distributing ER Documents (Supplemental to MCP-135 & MCP-9395)." The revisions can include additional analyses that might be necessary to meet appropriate waste acceptance criteria.

4.1.4 Sampling Equipment, Calibration, and Setup

Table 4-8 includes a list of equipment and supplies required for this project. This list is as extensive as possible and includes equipment for both the analytical and effects data collection; however, it is not exhaustive and should only be used as a guide.

Table 4-8. Equipment and supplies list.

	Plot Preparation	Proximal Soil Sampling	Mammal Sampling		Vegetation Sampling	
			Effects	Analytical	Effects	Analytical
Flexible tape, 50 m (164 ft) or longer	X	X	—	X	—	X
Rulers	X	X	—	—	—	X
Survey stakes	X	—	—	X	—	X
Field forms, logbooks, and clipboards	X	X	—	X	—	X
Flagging tape (various colors)	X	X	—	X	—	X
Wildlife identification information	—	—	—	X	—	—
Small (mouse-sized) and medium (rabbit-sized) live traps	—	—	—	X	—	—
Absorbent material (e.g., paper towels and cloth rags)	—	X	—	X	—	X
Permanent markers, sample labels, and bar codes	X	X	—	X	—	X
Latex/nitrile gloves	—	X	—	X	—	X
EPA-approved sampling containers as specified by the analytical method (see QAPjP [DOE-ID 2004])	—	X	—	X	—	X
Logbooks	—	X	X	X	X	X
Sealable plastic bags (various sizes)	—	X	—	X	—	X
Strapping tape and duct tape	—	X	—	X	—	X
Data sheets	—	—	X	—	X	—
Distilled, deionized water (including decontamination water)	—	X	—	X	—	X
Sample preservatives as specified by analytical method (see FSP and QAPjP)	—	X	—	—	—	—
Plastic tubs for rinsing sampling equipment	—	X	—	X	—	X
Tweezers, tongs, and forceps	—	—	—	X	—	X
PPE, as specified in the JSA	X	X	—	X	—	X
Aluminum foil or plastic wrap	—	X	—	—	X	—
Plastic bubble wrap, starch packing beads, or foam sheeting for sample shipment (no diatomaceous earth)	—	X	—	X	—	X
Laboratory scales: 2-kg capacity with 0.1-g resolution; 200-g capacity with 0.01-g resolution	—	—	X	X	—	X
Global positioning system unit	X	—	—	—	—	—

Table 4-8. (continued).

	Plot Preparation	Proximal Soil Sampling	Mammal Sampling		Vegetation Sampling	
			Effects	Analytical	Effects	Analytical
Bleach for decontaminating traps and sampling tools	—	—	—	X	—	—
Scales for weighing animals (various sizes of Pesola)	—	—	—	X	—	—
Stainless-steel pans	—	X	—	X	—	X
Ear tags	—	—	X	—	—	—
Ear tagger	—	—	X	—	—	—
Disinfectant wipes	—	—	X	X	—	—
Hand lens	—	X	X	—	X	—
Dissecting kit	—	—	X	—	—	—
Stainless-steel scoops for soil sampling	—	X	—	—	—	—
Stainless-steel auger	—	X	—	—	—	—
Plastic containers (e.g., carboys) for containing used rinse water	—	X	—	X	—	X
Leather gloves (various sizes)	X	X	—	X	—	X
Plant press	—	—	—	—	—	X
Large and small coolers	—	X	—	X	—	X
Reusable ice packs	—	X	—	X	—	X
Shovels	X	—	—	—	—	—
Grass clippers	—	—	—	—	—	X
Pruning shears	—	—	—	—	—	X
Bait (peanut butter, molasses, grain)	—	—	—	X	—	—
Soil test kit	—	X	—	—	—	—

The FTL works closely with sampling personnel to ensure that sampling equipment is operating as recommended by the manufacturer and according to design specifications. Presampling inspections of equipment are conducted to ensure that the equipment is functioning properly. Corrective actions for repair or maintenance of any sampling equipment will be immediate and confirmed by the FTL or project manager before proceeding with sampling.

Radiological control personnel are responsible for calibrating radiological monitoring equipment, and placing and handling the telemetry dosimeters. Industrial Hygiene is responsible for measuring and evaluating chemical hazards. All calibrations will be documented in the calibration logbooks.

4.1.5 Sample Designation and Labeling

Each sample bottle contains a label identifying the field sample number, the analyses requested, the sample date and time, and the sampler. Labels are secured on the sample using clear plastic tape.

Uniqueness is required for maintaining consistency and preventing the same identification code from being assigned to more than one sample. A systematic character code may be used to identify all samples uniquely.

4.1.6 Chain of Custody

Chain-of-custody (COC) procedures begin immediately after collecting the first sample. At the time of sample collection, the sampling team initiates a COC form for each sample. All samples remain in the custody of a sampling team member until custody is transferred to the analytical laboratory sample custodian. Upon receipt at the laboratory, the sample custodian reviews the sample labels and the COC form to ensure completeness and accuracy. If discrepancies are noted during this review, immediate corrective action is sought with the sampling team member(s) relinquishing custody as identified on the COC. Pending successful corrective action, the laboratory sample custodian signs and dates the COC form, signifying acceptance of delivery and custody of the samples.

4.1.7 Sample Collection Procedures

Samples will be collected using the procedures in Appendix B of this document and the stand-alone document TPR-145, "Biotic and Proximal Soil Sampling," and other relevant sampling procedures and guides, e.g., Guide (GDE)-279, "Surface Water Sampling for the Idaho Completion Project."

4.1.8 Equipment Decontamination Procedures

Decontamination of most sampling equipment will be accomplished using guidance in GDE-282, "Decontaminating Ecological Sampling Equipment for the Idaho Completion Project."

4.1.9 Sample Transport

Field team members will prepare the samples for transport in accordance with MCP-1193, "Handling and Shipping Samples for ER and D&D&D Projects," by securing the labels using clear tape, placing parafilm or stretch tape on the bottles to secure the lids, and placing the bottles in sealed bags. The field team member will wrap the samples in cushioning material and place them in the sample cooler. If necessary, the field team member will place Blue Ice (or equivalent) in the cooler to maintain the required temperature. The field team member will place the completed and signed chain of custody (COC) form in the cooler, tape the cooler shut, and place the custody seals on the cooler to prevent tampering.

The field team member will complete the applicable shipping papers (Form Series 460 or 461, as applicable), secure address labels to the cooler, and deliver the coolers to the shipping authority for transport.

4.1.10 Waste Management

The analytical laboratory will dispose of samples submitted to it for analyses or will return them to the requestor as stated in the applicable SOWs. Samples returned from the laboratory will be accepted only if the original label is intact and legible. If the samples are returned, then the project manager is responsible for properly disposing of the sample with the assistance of WGS personnel. Disposal must be preapproved and documented by WGS personnel.

4.1.10.1 Solid Waste Management. Solid waste generated will include PPE trash and miscellaneous waste such as wipes and packaging. Waste that does not come into direct contact with the sampled media or sampling equipment can be disposed of as nonconditional, nonradioactive waste at the

CFA landfill complex unless beta/gamma radiation or contamination above INL Site release criteria is detected.

All PPE and other waste material directly used in sampling, decontamination, etc., will be bagged and placed in containers recommended by WGS.

In the unlikely event that nonhazardous radioactive waste is generated, it will be disposed of at the Idaho CERCLA Disposal Facility (ICDF). WGS will approve and prepare individual waste streams destined for disposal at the ICDF in accordance with the *ICDF Complex Waste Acceptance Criteria* (DOE-ID 2005b).

4.1.10.2 Soil-Specific Waste Management. Offsite laboratories will dispose of both altered and unaltered samples as contractually required. However, onsite laboratory gamma screening of samples will be completed, and these unaltered samples will be restored to the collection site. In the event that samples must be returned from the offsite laboratory, only unused and unaltered samples in the original containers will be accepted. Although no samples are expected to be returned from the offsite laboratory and all screening samples are expected to be eligible for return to the collection site, disposition of samples that cannot be restored to a collection site is coordinated with the appropriate waste-generator interface. Such coordination will help to ensure compliance with applicable waste characterization, treatment, and disposal regulations.

Decontamination solutions used in small quantities might include deionized water, detergent, bleach/water, and (in the laboratory hood) isopropanol. It is anticipated that no decontamination fluids requiring containment will be generated during sampling. The use of spray bottles to apply the fluids will minimize the amount of decontamination fluids produced. Only clean water and biodegradable soap are used in the field for decontamination. Excess water will be allowed to drain onto the ground in the staging area used during sampling.

4.1.10.3 Waste Minimization. Waste reduction philosophies and techniques will be emphasized, and personnel will be encouraged to attempt to improve methods continuously. Personnel must not use, consume, spend, or expend equipment or materials carelessly. Practices to be instituted to support waste minimization include, but are not limited to, the following:

- Restrict material (especially hazardous material) entering control zones to what is needed to do the work
- Substitute recyclable or burnable items for disposable items
- Reuse items when practical
- Segregate contaminated from uncontaminated waste
- Segregate reusable items such as PPE and tools.

Waste generated during the characterization project includes samples, sampling equipment, and PPE. These articles are handled, characterized, and disposed of in accordance with the *Idaho National Engineering and Environmental Laboratory Waste Acceptance Criteria* (DOE-ID 2005c). Personnel from WGS coordinate waste disposal activities in accordance with INL Site procedures. Waste will be bagged, placed in containers, labeled, and stored in an approved storage area pending disposition. The project manager, with assistance from WGS, will prepare waste determination and disposition forms for determining the disposition routes for all waste generated during sampling and analysis.

4.2 Sample Analysis

Laboratories on the ICP Qualified Suppliers List will be used to analyze the samples in accordance with project requirements, including ER SOW 394, "Sample and Analysis Management Statement of Work for Analytical Services."

Project-specific, request-for-analyses forms, or SOW(s), identify additional requirements for laboratory analysis. The following subsections identify analysis requirements for the characterization project.

4.2.1 Analytical Methods

To ensure that data of acceptable quality are obtained from the characterization project, standard EPA laboratory methods or technically appropriate methods for analytical determinations will be used to obtain sample data. The SAM Program is responsible for obtaining laboratory analytical services for the required analyses in accordance with ICP-MCP-9439, "Environmental Sampling Activities at the INEEL." The SAM Program will prepare two SOWs for laboratory services: (1) "Radiological Analyses of Samples Collected for the Long-Term Ecological Monitoring for 2006 at the INL" and (2) "Organic, Inorganic, and Miscellaneous Classical Analyses of Samples Collected for the Long-Term Ecological Monitoring for 2006 at the INL." These SOWs (along with Table 1-3) will include the analytical methods and the project-required detection limits for each analysis type listed in the Appendix A sampling and analysis plan tables and field guidance forms. Project-specific detection limits are presented in Table 1-3. Any deviations from this information will be fully documented, and the laboratory will inform the SAM and the technical lead of the deviations. Methods for other less-typical activities, such as histopathic inspection of deer mice liver and kidney samples, will follow the contracted laboratory's standard protocol. Bioassays (earthworm and seedling toxicity tests) will be performed to appropriate standards of the American Society for Testing and Materials or other accepted methods, as determined by the technical lead.

4.2.2 Instrument Calibration Procedures

Laboratory instruments are calibrated in accordance with each of the specified analytical methods. The laboratory quality assurance plan must include requirements for calibrations when specifications are not listed in analytical methods. Calibrations that are typically not called out in analytical methods include ancillary laboratory equipment and verification of reference standards used for calibration and standard preparation. Laboratory documentation includes calibration techniques and sequential calibration actions, performance tolerances provided by the specific analytical method, and dates and frequency of the calibrations. All analytical methods have specifications for equipment checks and instrument calibrations. The laboratory complies with all method-specific calibration requirements for all requested parameters. If failure of instrument calibration or equipment is detected, then the instrument will be recalibrated, and all affected samples will be analyzed using an acceptable calibration.

4.2.3 Laboratory Records

Laboratories that analyze the samples are required to keep records of sample receipt, processing, analysis, and data reporting. Sample management records must document sample receipt, sample handling and storage, and the sample analysis schedule. The records will be used to verify that the COC and proper preservation are maintained, document anomalies in the samples, note proper log-in of samples into the laboratory, and address procedures used to prioritize received samples, thereby ensuring that the holding time requirements are met.

The laboratory is responsible for maintaining documentation that demonstrates laboratory proficiency with each method as prescribed in standard operating procedures. Laboratory documentation includes sample preparation and analysis details, instrument standardization, detection and reporting limits, and test-specific quality control criteria. Any deviations from prescribed methods must be recorded properly. Quality assurance/quality control reports will include general quality control records on activities such as analyst training, instrument calibration, routine monitoring of analytical performance, and calibration verification. Project-specific information (e.g., blanks, spikes, calibration check samples, replicates, and splits performed in accordance with project requirements) may be performed and documented. Specific requirements for the quantity and types of quality assurance/quality control monitoring and associated reporting formats will be specified in the task-specific laboratory SOW.

4.3 Data Management and Document Control

4.3.1 Data Reporting

A basic ordering agreement standard deliverable is required for all data reported for this characterization project. The final data documentation package will conform to the criteria specified in ER-SOW-394.

The environmental restoration SOW, prepared by the SAM Program, will be the standard for analytical data deliverable requirements for the laboratories used by the INL Site. All laboratories associated with this project will adhere to the document used to establish technical and reporting standards.

4.3.2 Data Validation

Analytical data validation is the comparison of analytical results with the requirements established by the analytical method. Validation involves evaluating all sample-specific information generated from sample collection to receipt of the final data package. Data validation is used to determine whether analytical data are technically and legally defensible and reliable. The final product of the validation process is the validation report. The validation report communicates the quality and usability of the data to the decision-makers.

All data generated for this project will undergo independent validation. The SAM Program arranges for validation. Level B validation is requested for all sample data reports generated during this project. The validation report contains an itemized discussion of the validation process and results. Copies of the data forms annotated for qualification are attached to the validation report.

4.3.3 Data Quality Assessment

The data quality assessment process will be used to ascertain whether the data meet the project DQOs. Additional steps of the data quality assessment process may involve data plotting, testing for outlying data points, and other statistical analyses relative to the characterization project DQOs.

For this characterization plan, a 90% completeness objective for all analyses has been established, because some sample locations might not contain enough material for all analyses requested. The completeness of the data is the number of samples collected and analyzed compared to the number of samples planned.

Precision is a measure of agreement among replicate measurements of the same property. Accuracy is a measure of the closeness of an individual measurement to the true value. Field and laboratory precision and accuracy should be within the limits and goals mentioned in the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Deactivation, Decontamination, and Decommissioning* (DOE-ID 2004). Data results will be evaluated upon project completion to determine whether precision and accuracy goals have been met.

4.3.4 Final Characterization Report

A final characterization report will be prepared for this project in accordance with applicable program requirements. The final report will contain a summary of all sample data generated during this sampling effort. Appendixes containing all sample results may be attached. The final report will also describe the sample collection effort. A description of the data quality assessment process may also be included. The final report will discuss how the data will be used. The DQOs will be reviewed and evaluated to determine whether the characterization project's objectives have been met.

4.3.5 Document Control

Document control consists of clearly identifying all project-specific documents in an orderly manner, securely storing all project information, and controlling the distribution of all project information. Document control will ensure that controlled documents of all types related to the project receive appropriate levels of review, comment, and revision (as necessary). The project manager is responsible for properly maintaining project documents according to INL Site document control requirements. Upon completion of the characterization project, all project documentation and information will be transferred to compliant storage according to project, program, and company requirements. This information may include field logbooks, COC forms, laboratory data reports, engineering calculations and drawings, and final technical reports.

5. HEALTH AND SAFETY REQUIREMENTS

A hazard screening checklist was completed in accordance with the requirements of MCP-3562, "Hazard Identification, Analysis, and Control of Operational Activities," to identify hazards associated with this project. The hazards identified in the checklist, along with corresponding mitigation requirements, are documented in JSA-771 in accordance with MCP-3450, "Developing and Using Job Safety Analyses." By virtue of completing the JSA, technical input and approval were obtained from assigned ESH&QA personnel. In addition, hazards and mitigations have been integrated into TPR-145, "Biotic and Proximal Soil Sampling," which was developed for this project. Hazard identification, mitigation, and training for the majority of work planned in this document are covered under JSA-771 and TPR-145.

Additional training (40-hour HAZWOPER) is required for work that is completed in CERCLA sites when potentially contaminated media are being sampled. The additional training and documentation for workers disturbing the media of concern at the sites discussed below are required to ensure compliance with regulations related to CERCLA. Hazard mitigation and PPE requirements are the same as those for similar work as listed in JSA-771 and TPR-145. Personnel who sample the potentially contaminated media at the specific locations listed below must be trained 40-hour HAZWOPER workers and must work under PLN-2128, "Miscellaneous Sites Cleanup Project Health, Safety, and Work Control Plan." The specific locations include the

- CFA Motor Pool Pond (Plots 6 and 7 in Figure 1-2)
- Liquid Corrosive Chemical Disposal Area (Plot 5 in Figure 1-3)
- MFC Industrial Waste Pond (Figure 1-4).

The potentially contaminated media includes the soil at the CFA Motor Pool Pond and the Liquid Corrosive Chemical Disposal Area. These two sites are "No Action" under CERCLA because the potential contaminants do not pose an unacceptable risk to human health or the environment. Workers completing other work (small mammal trapping, vegetation sampling, etc.) at these locations do not have to be HAZWOPER trained.

The Industrial Waste Pond was fully remediated under a CERCLA action, is "No Further Action, and is not considered a risk to human health or the environment, but low-level contamination (Cs-137) still exists in the sediments in concentrations that are below the cleanup criteria. The water, sediment, and cattails (if present) are considered potentially contaminated. All work at this site requires HAZWOPER trained personnel.

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Appendix A

Sampling and Analysis Plan Tables

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR231	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 1	NA				5				1			1									
ECR232	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 2	NA				5				1			1									
ECR233	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 3	NA				5				1			1									
ECR234	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 4	NA				5				1			1									
ECR235	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 5	NA				5				1			1									
ECR236	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 6	NA				5				1			1									
ECR237	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 7	NA				5				1			1									
ECR238	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 8	NA				5				1			1									
ECR239	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT 9	NA				5				1			1									
ECR240	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	DEER MOUSE	REF.AREA PLOT10	NA				5				1			1									
ECR241	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 1	NA								2			2									
ECR242	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 2	NA								1			D 1									
ECR243	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 3	NA								1			1									
ECR244	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 4	NA								1			1									
ECR245	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 5	NA								1			1									

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR246	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 6	NA								1			1									
ECR247	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 7	NA								1			1									
ECR248	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 8	NA								1			1									
ECR249	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT 9	NA								1			1									
ECR250	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	SAGEBRUSH	REF.AREA PLOT10	NA								1			1									
ECR251	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 1	NA								2			2									
ECR252	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 2	NA								1			D 1									
ECR253	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 3	NA								1			1									
ECR254	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 4	NA								1			1									
ECR255	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 5	NA								1			1									
ECR256	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 6	NA								1			1									
ECR257	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 7	NA								1			1									
ECR258	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 8	NA								1			1									
ECR259	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT 9	NA								1			1									
ECR260	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	REFERENCE AREA	CRESTED WHEATGR	REF.AREA PLOT10	NA								1			1									

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA								
ECR261	REG/QC	SOIL	DUP	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 1	0-2 INCHES	2							2	2		2										
ECR262	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 2	0-2 INCHES	1							1	1		D 1										
ECR263	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 3	0-2 INCHES	1							1	1		1										
ECR264	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 4	0-2 INCHES	1							1	1		1										
ECR265	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 5	0-2 INCHES	1							1	1		1										
ECR266	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 6	0-2 INCHES	1							1	1		1										
ECR267	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 7	0-2 INCHES	1							1	1		1										
ECR268	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 8	0-2 INCHES	1							1	1		1										
ECR269	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT 9	0-2 INCHES	1							1	1		1										
ECR270	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SURFACE SOILS	REF.AREA PLOT10	0-2 INCHES	1							1	1		1										
ECR271	REG/QC	SOIL	DUP	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 1	2-24 INCHES	2							2	2		2										
ECR272	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 2	2-24 INCHES	1							1	1		D 1										
ECR273	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 3	2-24 INCHES	1							1	1		1										
ECR274	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 4	2-24 INCHES	1							1	1		1										
ECR275	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 5	2-24 INCHES	1							1	1		1										

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR276	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 6	2-24 INCHES	1							1	1		1									
ECR277	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 7	2-24 INCHES	1							1	1		1									
ECR278	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 8	2-24 INCHES	1							1	1		1									
ECR279	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT 9	2-24 INCHES	1							1	1		1									
ECR280	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SUBSURFACE SOIL	REF.AREA PLOT10	2-24 INCHES	1							1	1		1									
ECR281	REG/QC	SOIL	DUP	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 1	0-3 INCHES							2													
ECR282	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 2	0-3 INCHES							1													
ECR283	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 3	0-3 INCHES							1													
ECR284	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 4	0-3 INCHES							1													
ECR285	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 5	0-3 INCHES							1													
ECR286	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 6	0-3 INCHES							1													
ECR287	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 7	0-3 INCHES							1													
ECR288	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 8	0-3 INCHES							1													
ECR289	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 9	0-3 INCHES							1													
ECR290	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT10	0-3 INCHES							1													

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

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AT3: Gamma Spec

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AT5: Hydrogen Ion (pH)

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AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR291	REG/QC	SOIL	DUP	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 1	0-12 INCHES		2																		
ECR292	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 2	0-12 INCHES		1																		
ECR293	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 3	0-12 INCHES		1																		
ECR294	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 4	0-12 INCHES		1																		
ECR295	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 5	0-12 INCHES		1																		
ECR296	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 6	0-12 INCHES		1																		
ECR297	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 7	0-12 INCHES		1																		
ECR298	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 8	0-12 INCHES		1																		
ECR299	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT 9	0-12 INCHES		1																		
ECR300	REG	SOIL	GRAB	COMP	06/01/2006	REFERENCE AREA	SOIL	REF.AREA PLOT10	0-12 INCHES		1																		
ECR301	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	MACKAY RES	PLANT	MACKAY RES 1	NA						2		2				2								
ECR302	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MACKAY RES	PLANT	MACKAY RES 2	NA						1		1				D 1								
ECR303	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MACKAY RES	PLANT	MACKAY RES 3	NA						1		1				1								
ECR304	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MACKAY RES	PLANT	MACKAY RES 4	NA						1		1				1								
ECR305	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MACKAY RES	PLANT	MACKAY RES 5	NA						1		1				1								

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

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AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR306	REG/QC	WATER	DUP	COMP	06/01/2006	MACKAY RES	WATER	MACKAY RES 1	NA					2	2		2				2								
ECR307	REG	WATER	GRAB	COMP	06/01/2006	MACKAY RES	WATER	MACKAY RES 2	NA					1	1		1				D 1								
ECR308	REG	WATER	GRAB	COMP	06/01/2006	MACKAY RES	WATER	MACKAY RES 3	NA					1	1		1				1								
ECR309	REG	WATER	GRAB	COMP	06/01/2006	MACKAY RES	WATER	MACKAY RES 4	NA					1	1		1				1								
ECR310	REG	WATER	GRAB	COMP	06/01/2006	MACKAY RES	WATER	MACKAY RES 5	NA					1	1		1				1								
ECR311	REG/QC	SEDIMENT	DUP	COMP	06/01/2006	MACKAY RES	SEDIMENT	MACKAY RES 1	NA					2	2		2				2								
ECR312	REG	SEDIMENT	GRAB	COMP	06/01/2006	MACKAY RES	SEDIMENT	MACKAY RES 2	NA					1	1		1				D 1								
ECR313	REG	SEDIMENT	GRAB	COMP	06/01/2006	MACKAY RES	SEDIMENT	MACKAY RES 3	NA					1	1		1				1								
ECR314	REG	SEDIMENT	GRAB	COMP	06/01/2006	MACKAY RES	SEDIMENT	MACKAY RES 4	NA					1	1		1				1								
ECR315	REG	SEDIMENT	GRAB	COMP	06/01/2006	MACKAY RES	SEDIMENT	MACKAY RES 5	NA					1	1		1				1								
ECR316	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 1	NA			1	5		1		1												
ECR317	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 2	NA			1	5		1		1												
ECR318	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 3	NA			1	5		1		1		1										
ECR319	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 4	NA			1	5		1		1												
ECR320	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 5	NA			1	5		1		1												

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA								
ECR321	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 6	NA			1	5		1		1												
ECR322	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 7	NA			1	5		1		1												
ECR323	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 8	NA			1	5		1		1												
ECR324	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 9	NA			1	5		1		1												
ECR325	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	CFA	DEER MOUSE	CFA PLOT 10	NA			1	5		1		1												
ECR326	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 1	NA			2			2		2												
ECR327	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 2	NA			1			1		1												
ECR328	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 3	NA			1			1		1		1										
ECR329	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 4	NA			1			1		1												
ECR330	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 5	NA			1			1		1												
ECR331	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 6	NA			1			1		1												
ECR332	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 7	NA			1			1		1												
ECR333	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 8	NA			1			1		1												
ECR334	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 9	NA			1			1		1												
ECR335	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	SAGEBRUSH	CFA PLOT 10	NA			1			1		1												

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR336	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 1	NA			2			2		2												
ECR337	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 2	NA			1			1		1												
ECR338	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 3	NA			1			1		1		1										
ECR339	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 4	NA			1			1		1												
ECR340	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 5	NA			1			1		1												
ECR341	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 6	NA			1			1		1												
ECR342	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 7	NA			1			1		1												
ECR343	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 8	NA			1			1		1												
ECR344	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 9	NA			1			1		1												
ECR345	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	CFA	CRESTED WHEATGR	CFA PLOT 10	NA			1			1		1												
ECR346	REG/QC	SOIL	DUP	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 1	0-2 INCHES	2		2			2		2												
ECR347	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 2	0-2 INCHES	1		1			1		1												
ECR348	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 3	0-2 INCHES	1		1			1		1		1										
ECR349	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 4	0-2 INCHES	1		1			1		1												
ECR350	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 5	0-2 INCHES	1		1			1		1												

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA								
ECR351	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 6	0-2 INCHES	1		1			1		1												
ECR352	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 7	0-2 INCHES	1		1			1		1												
ECR353	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 8	0-2 INCHES	1		1			1		1												
ECR354	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 9	0-2 INCHES	1		1			1		1												
ECR355	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SURFACE SOIL	CFA PLOT 10	0-2 INCHES	1		1			1		1												
ECR356	REG/QC	SOIL	DUP	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 1	2-24 INCHES	2		2			2		2												
ECR357	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 2	2-24 INCHES	1		1			1		1												
ECR358	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 3	2-24 INCHES	1		1			1		1		1										
ECR359	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 4	2-24 INCHES	1		1			1		1												
ECR360	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 5	2-24 INCHES	1		1			1		1												
ECR361	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 6	2-24 INCHES	1		1			1		1												
ECR362	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 7	2-24 INCHES	1		1			1		1												
ECR363	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 8	2-24 INCHES	1		1			1		1												
ECR364	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 9	2-24 INCHES	1		1			1		1												
ECR365	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SUBSURFACE SOIL	CFA PLOT 10	2-24 INCHES	1		1			1		1												

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA					-		
ECR366	REG/QC	SOIL	DUP	COMP	06/01/2006	CFA	SOIL	CFA PLOT 1	0-3 INCHES							2													
ECR367	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 2	0-3 INCHES							1													
ECR368	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 3	0-3 INCHES							1													
ECR369	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 4	0-3 INCHES							1													
ECR370	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 5	0-3 INCHES							1													
ECR371	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 6	0-3 INCHES							1													
ECR372	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 7	0-3 INCHES							1													
ECR373	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 8	0-3 INCHES							1													
ECR374	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 9	0-3 INCHES							1													
ECR375	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 10	0-3 INCHES							1													
ECR376	REG/QC	SOIL	DUP	COMP	06/01/2006	CFA	SOIL	CFA PLOT 1	0-12 INCHES		2																		
ECR377	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 2	0-12 INCHES		1																		
ECR378	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 3	0-12 INCHES		1																		
ECR379	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 4	0-12 INCHES		1																		
ECR380	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 5	0-12 INCHES		1																		

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

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AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

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AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target

Analyte List [TAL]: Sb, As, Be, Be, Cd, Cr, Co, Cu, Hg, Pb,

Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

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SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																	
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR381	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 6	0-12 INCHES		1																		
ECR382	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 7	0-12 INCHES		1																		
ECR383	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 8	0-12 INCHES		1																		
ECR384	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 9	0-12 INCHES		1																		
ECR385	REG	SOIL	GRAB	COMP	06/01/2006	CFA	SOIL	CFA PLOT 10	0-12 INCHES		1																		
ECR386	REG/QC	PLANT BIOTA	DUP	GRAB	06/01/2006	MFC	PLANT	IWP PLOT 1	NA						2		2			2									
ECR387	REG	PLANT BIOTA	COMP	GRAB	06/01/2006	MFC	PLANT	IWP PLOT 2	NA						1		1			$_{D}1$									
ECR388	REG	PLANT BIOTA	COMP	GRAB	06/01/2006	MFC	PLANT	IWP PLOT 3	NA						1		1			1									
ECR389	REG	PLANT BIOTA	COMP	GRAB	06/01/2006	MFC	PLANT	IWP PLOT 4	NA						1		1			1									
ECR390	REG	PLANT BIOTA	COMP	GRAB	06/01/2006	MFC	PLANT	IWP PLOT 5	NA						1		1			1									
ECR391	REG/QC	WATER	DUP	GRAB	06/01/2006	MFC	WATER	IWP PLOT 1	NA					2	2		2			2									
ECR392	REG	WATER	COMP	GRAB	06/01/2006	MFC	WATER	IWP PLOT 2	NA					1	1		1			$_{D}1$									
ECR393	REG	WATER	COMP	GRAB	06/01/2006	MFC	WATER	IWP PLOT 3	NA					1	1		1			1									
ECR394	REG	WATER	COMP	GRAB	06/01/2006	MFC	WATER	IWP PLOT 4	NA					1	1		1			1									
ECR395	REG	WATER	COMP	GRAB	06/01/2006	MFC	WATER	IWP PLOT 5	NA					1	1		1			1									

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA								
ECR396	REG/QC	SEDIMENT	DUP	GRAB	06/01/2006	MFC	SEDIMENT	IWP PLOT 1	NA					2	2		2			2										
ECR397	REG	SEDIMENT	COMP	GRAB	06/01/2006	MFC	SEDIMENT	IWP PLOT 2	NA					1	1		1			D 1										
ECR398	REG	SEDIMENT	COMP	GRAB	06/01/2006	MFC	SEDIMENT	IWP PLOT 3	NA					1	1		1			1										
ECR399	REG	SEDIMENT	COMP	GRAB	06/01/2006	MFC	SEDIMENT	IWP PLOT 4	NA					1	1		1			1										
ECR400	REG	SEDIMENT	COMP	GRAB	06/01/2006	MFC	SEDIMENT	IWP PLOT 5	NA					1	1		1			1										
ECR401	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 1	NA				5		1		1			1		1								
ECR402	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 2	NA				5		1		1			1		1								
ECR403	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 3	NA				5		1		1			1		1								
ECR404	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 4	NA				5		1		1			1		1								
ECR405	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 5	NA				5		1		1			1		1								
ECR406	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 6	NA				5		1		1			1		1								
ECR407	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 7	NA				5		1		1			1		1								
ECR408	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 8	NA				5		1		1			1		1								
ECR409	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 9	NA				5		1		1			1		1								
ECR410	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	RWMC	DEER MOUSE	RWMC PLOT 10	NA				5		1		1			1		1								

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D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

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AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR414	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 1	NA						2		2			2		2							
ECR415	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 2	NA						1		1			D 1		T 1							
ECR416	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 3	NA						1		1			1		1							
ECR417	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 4	NA						1		1			1		1							
ECR418	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 5	NA						1		1			1		1							
ECR419	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 6	NA						1		1			1		1							
ECR420	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 7	NA						1		1			1		1							
ECR421	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 8	NA						1		1			1		1							
ECR422	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 9	NA						1		1			1		1							
ECR423	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	SAGEBRUSH	RWMC PLOT 10	NA						1		1			1		1							
ECR424	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 1	NA						2		2			2		2							
ECR425	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 2	NA						1		1			D 1		T 1							
ECR426	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 3	NA						1		1			1		1							
ECR427	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 4	NA						1		1			1		1							
ECR428	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 5	NA						1		1			1		1							

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR429	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 6	NA						1		1			1		1							
ECR430	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 7	NA						1		1			1		1							
ECR431	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 8	NA						1		1			1		1							
ECR432	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 9	NA						1		1			1		1							
ECR433	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	RWMC	CRESTED WHEATGR	RWMC PLOT 10	NA						1		1			1		1							
ECR434	REG/QC	SOIL	DUP	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 1	0-2 INCHES	2					2		2	1		2		2							
ECR435	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 2	0-2 INCHES	1					1		1	1		1_D		1_T							
ECR436	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 3	0-2 INCHES	1					1		1	1		1		1							
ECR437	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 4	0-2 INCHES	1					1		1	1		1		1							
ECR438	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 5	0-2 INCHES	1					1		1	1		1		1							
ECR439	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 6	0-2 INCHES	1					1		1	1		1		1							
ECR440	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 7	0-2 INCHES	1					1		1	1		1		1							
ECR441	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 8	0-2 INCHES	1					1		1	1		1		1							
ECR442	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 9	0-2 INCHES	1					1		1	1		1		1							
ECR443	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SURFACE SOIL	RWMC PLOT 10	0-2 INCHES	1					1		1	1		1		1							

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Tl, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR444	REG/QC	SOIL	DUP	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 1	2-24 INCHES	2					2		2	1		2		2							
ECR445	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 2	2-24 INCHES	1					1		1	1		$_{D}$1		$_{T}$1							
ECR446	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 3	2-24 INCHES	1					1		1	1		1		1							
ECR447	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 4	2-24 INCHES	1					1		1	1		1		1							
ECR448	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 5	2-24 INCHES	1					1		1	1		1		1							
ECR449	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 6	2-24 INCHES	1					1		1	1		1		1							
ECR450	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 7	2-24 INCHES	1					1		1	1		1		1							
ECR451	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 8	2-24 INCHES	1					1		1	1		1		1							
ECR452	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 9	2-24 INCHES	1					1		1	1		1		1							
ECR453	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SUBSURFACE SOIL	RWMC PLOT 10	2-24 INCHES	1					1		1	1		1		1							
ECR454	REG/QC	SOIL	DUP	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 1	0-3 INCHES							2													
ECR455	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 2	0-3 INCHES							1													
ECR456	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 3	0-3 INCHES							1													
ECR457	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 4	0-3 INCHES							1													
ECR458	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 5	0-3 INCHES							1													

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

D - Double QC Volume T - Triple QC Volume

AT1: Analysis Suite #1

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AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

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AT13: VOCs (TAL)

AT14:

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AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR459	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 6	0-3 INCHES							1													
ECR460	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 7	0-3 INCHES							1													
ECR461	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 8	0-3 INCHES							1													
ECR462	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 9	0-3 INCHES							1													
ECR463	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 10	0-3 INCHES							1													
ECR464	REG/QC	SOIL	DUP	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 1	0-24 INCHES		2																		
ECR465	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 2	0-24 INCHES		1																		
ECR466	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 3	0-24 INCHES		1																		
ECR467	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 4	0-24 INCHES		1																		
ECR468	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 5	0-24 INCHES		1																		
ECR469	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 6	0-24 INCHES		1																		
ECR470	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 7	0-24 INCHES		1																		
ECR471	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 8	0-24 INCHES		1																		
ECR472	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 9	0-24 INCHES		1																		
ECR473	REG	SOIL	GRAB	COMP	06/01/2006	RWMC	SOIL	RWMC PLOT 10	0-24 INCHES		1																		

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Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

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SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA								
ECR474	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 1	NA				5		1		1			1									
ECR475	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 2	NA				5		1		1			1									
ECR476	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 3	NA				5		1		1			1									
ECR477	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 4	NA				5		1		1			1									
ECR478	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 5	NA				5		1		1			1									
ECR479	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 6	NA				5		1		1			1									
ECR480	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 7	NA				5		1		1			1									
ECR481	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 8	NA				5		1		1			1									
ECR482	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 9	NA				5		1		1			1									
ECR483	REG	ANIMAL BIOTA	GRAB	COMP	06/01/2006	MFC	DEER MOUSE	MFC PLOT 10	NA				5		1		1			1									
ECR484	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 1	NA						2		2			2									
ECR485	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 2	NA						1		1			D 1									
ECR486	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 3	NA						1		1			1									
ECR487	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 4	NA						1		1			1									
ECR488	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 5	NA						1		1			1									

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AT2: Analysis Suite #2

AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

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Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

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Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR489	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 6	NA						1		1			1									
ECR490	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 7	NA						1		1			1									
ECR491	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 8	NA						1		1			1									
ECR492	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 9	NA						1		1			1									
ECR493	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	SAGEBRUSH	MFC PLOT 10	NA						1		1			1									
ECR494	REG/QC	PLANT BIOTA	DUP	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 1	NA						2		2			2									
ECR495	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 2	NA						1		1			D 1									
ECR496	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 3	NA						1		1			1									
ECR497	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 4	NA						1		1			1									
ECR498	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 5	NA						1		1			1									
ECR499	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 6	NA						1		1			1									
ECR500	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 7	NA						1		1			1									
ECR501	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 8	NA						1		1			1									
ECR502	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 9	NA						1		1			1									
ECR503	REG	PLANT BIOTA	GRAB	COMP	06/01/2006	MFC	CRESTED WHEATGR	MFC PLOT 10	NA						1		1			1									

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AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

DRAFT

SAP Number: ICP/EXT-05-00778

Sampler: Haney, T. J.

Date: 03/21/2006 Plan Table Revision: 0.0 Project: LONG TERM ECOLOGICAL MONITORING FY06 Project Manager: HANEY, T. J. SMO Contact: CHAMBERS, L. S.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA								
ECR504	REG/QC	SOIL	DUP	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 1	0-2 INCHES	2					2		2			2										
ECR505	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 2	0-2 INCHES	1					1		1			1 D										
ECR506	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 3	0-2 INCHES	1					1		1			1										
ECR507	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 4	0-2 INCHES	1					1		1			1										
ECR508	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 5	0-2 INCHES	1					1		1			1										
ECR509	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 6	0-2 INCHES	1					1		1			1										
ECR510	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 7	0-2 INCHES	1					1		1			1										
ECR511	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 8	0-2 INCHES	1					1		1			1										
ECR512	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 9	0-2 INCHES	1					1		1			1										
ECR513	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SURFACE SOIL	MFC PLOT 10	0-2 INCHES	1					1		1			1										
ECR514	REG/QC	SOIL	DUP	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 1	2-24 INCHES	2					2		2			2										
ECR515	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 2	2-24 INCHES	1					1		1			1 D										
ECR516	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 3	2-24 INCHES	1					1		1			1										
ECR517	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 4	2-24 INCHES	1					1		1			1										
ECR518	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 5	2-24 INCHES	1					1		1			1										

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AT3: Gamma Spec

AT4: Histopathy

AT5: Hydrogen Ion (pH)

AT6: Mercury

AT7: Mesoarthopod

AT8: Metals Set # 1

AT9: Nitrate Salts

AT10: Nitroaromatics (8330)

AT11: Radiochemistry - Suite 1

AT12: Radiochemistry - Suite 3

AT13: VOCs (TAL)

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

NOTES for SOW: Add Be to the metals TAL for Reference areas and RWMC.

Metals (Target

Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb,

Mn, Ni, Se, Ag, Sr, Ti, V, Zn

Analysis Suites:

Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Plan Table Number: LTS_ECM_2006

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Sampler: Haney, T. J.

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Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																	
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Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	3A	9A	R4	3Z	PH	HG	3Y	Z4	NS	N7	RH	RX	VA							
ECR519	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 6	2-24 INCHES	1					1		1			1									
ECR520	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 7	2-24 INCHES	1					1		1			1									
ECR521	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 8	2-24 INCHES	1					1		1			1									
ECR522	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 9	2-24 INCHES	1					1		1			1									
ECR523	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SUBSURFACE SOIL	MFC PLOT 10	2-24 INCHES	1					1		1			1									
ECR524	REG/QC	SOIL	DUP	COMP	06/01/2006	MFC	SOIL	MFC PLOT 1	0-3 INCHES							2													
ECR525	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 2	0-3 INCHES							1													
ECR526	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 3	0-3 INCHES							1													
ECR527	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 4	0-3 INCHES							1													
ECR528	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 5	0-3 INCHES							1													
ECR529	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 6	0-3 INCHES							1													
ECR530	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 7	0-3 INCHES							1													
ECR531	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 8	0-3 INCHES							1													
ECR532	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 9	0-3 INCHES							1													
ECR533	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 10	0-3 INCHES							1													

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Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

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Contingencies:

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ECR534	REG/QC	SOIL	DUP	COMP	06/01/2006	MFC	SOIL	MFC PLOT 1	0-12 INCHES		2																		
ECR535	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 2	0-12 INCHES		1																		
ECR536	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 3	0-12 INCHES		1																		
ECR537	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 4	0-12 INCHES		1																		
ECR538	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 5	0-12 INCHES		1																		
ECR539	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 6	0-12 INCHES		1																		
ECR540	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 7	0-12 INCHES		1																		
ECR541	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 8	0-12 INCHES		1																		
ECR542	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 9	0-12 INCHES		1																		
ECR543	REG	SOIL	GRAB	COMP	06/01/2006	MFC	SOIL	MFC PLOT 10	0-12 INCHES		1																		

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Metals (Target Analyte List [TAL]: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mn, Ni, Se, Ag, Sr, Ti, V, Zn

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Analysis Suite #1: Moisture Content, Hydrogen Ion (pH), Cation Exchange Capacity

Analysis Suite #2: Plant Toxicity Test, Earthworm Toxicity Test

Radiochemistry - Suite 1: Am-241, Gamma Spec, Pu-Iso, U-Iso, Sr-90

Radiochemistry - Suite 3: Gamma Spec, Sr-90

Contingencies:

Appendix B

Sample Collection Procedures

Appendix B

Sample Collection Procedures

B-1. OVERVIEW

Sampling for long-term ecological monitoring (LTEM) occurs as presented in the *Long-Term Ecological Monitoring Plan for the Idaho National Engineering and Environmental Laboratory* (INEEL 2004). Efforts are directed at sampling to determine levels of contamination in the selected media and to detect possible effects. Levels of contamination in soil, deer mice, and plants are determined to validate the Operable Unit (OU) 10-04 ecological risk assessment's assumption of no migration of contamination off the areas of concern (AOCs) and to establish a baseline. Effects data are evaluated for soil fauna, plants, mammals, and avian receptors at the AOCs. This appendix presents the sampling procedures used to collect analytical and effects samples at each AOC:

1. Randomly select plots (generally 10) in the site location grids designated for Fiscal Year (FY) 2006 sampling.

2. Prepare the plots by staking the corners and center and distributing mammal traps in 3-m (10-ft) intervals on the 100 × 100-m (110 × 110-yd) plot, as shown in Figure B-1 and discussed in Technical Procedure (TPR) -145, "Biotic and Proximal Soil Sampling."

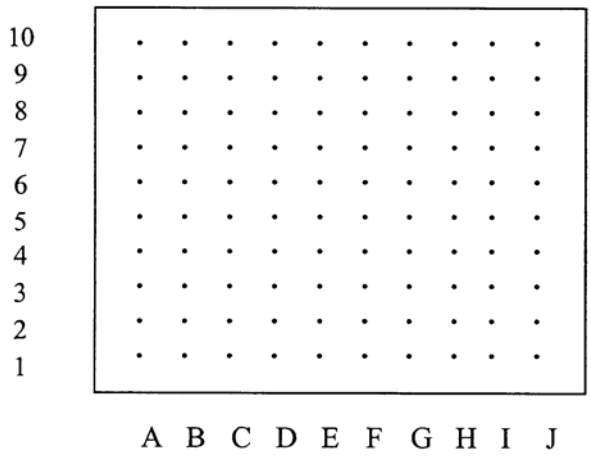

Figure B-1. Example of the transect design.

3. Obtain necessary paperwork, including safe work permits, scientific/trapping collection permits, and radiological work permits.

4. Obtain all sampling equipment, forms, and labels (as required).

5. Sample from May to September 2006:

    a. Perform soil sampling for plant and earthworm bioassays, analytical concentrations, and soil fauna community structure determination with the Berlese funnel extraction procedure.

b. Collect plant tissue for analysis.

c. Sample the small mammal community structure, presence/absence, diversity/richness, and density/biomass using the trap and release methodology (the sampling procedure is presented in Section B-3.1.3).

d. Sample the plant community structure, presence/absence, diversity/richness, and density/biomass (the sampling procedure is presented in Section B-3.1.1).

e. Sample bird community structure, presence/absence, diversity/richness, and density/biomass (the sampling procedure is presented in Section B-3.1.2).

f. Sample deer mouse tissue to obtain effects and analytical data (mice should be collected on the last day of community sampling).

g. Harvest small mammals for analytical concentration determination (the sampling procedure is presented in TPR-145).

h. Harvest small mammals for organ-to-body weight measurements, histopathology, and genetic samples (the sampling procedure is presented in Section B-3.4).

6. Decontaminate sampling equipment, the task site, and personnel (as necessary).

7. Prepare samples for storage and shipment to the appropriate facilities:

a. Histopathology specimens will be shipped to the laboratory.

b. Preserved invertebrates will be sent to the laboratory.

c. Bioassay soils will be shipped to the laboratory for plant and earthworm toxicity bioassays.

d. Soil samples will be shipped to the laboratory for chemical and radiological analysis.

e. Plant and small mammal samples will be frozen and shipped to the laboratory for chemical and radiological analysis.

f. Soil fauna will be extracted and the extract will be shipped to the analysts.

B-2. ANALYTICAL SAMPLING PROCEDURES

B-2.1 Biota Analytical Samples

Samples of vegetation, mammals, and soil will be collected for analysis of contaminant concentration.

B-2.1.1 Vegetation Sampling Procedure for Analytical Sampling

Two types of vegetation (shrubs and grasses), representing the two most common functional plant types at the Idaho National Laboratory (INL) Site, will be collected for chemical analysis. A review of dietary information for herbivorous and omnivorous INL Site wildlife species has resulted in consideration of the following individual plant species and/or types:

- Wyoming big sagebrush (*Artemisia tridentata*)
- Crested wheatgrass (*Agropyron cristatum*) or Indian rice grass (*Oryzopsis hymenoides)*
- Hardstem bulrush (*Scirpus acutus)* or other aquatic plant.

Sagebrush is the shrub most commonly used by the INL Site's primary consumers, including the pronghorn, sage grouse, black-tailed jackrabbit, Nuttall's cottontail rabbit, and the pygmy rabbit. In addition, sagebrush is an important component in the diets of avian and mammalian omnivores and herbivorous insects. Wheatgrasses are most widely used and are significant components in the diets of jackrabbits, cottontail rabbits, birds, and small mammals. If crested wheatgrass is unavailable, or the amount is not sufficient, Indian rice grass or other wheatgrasses will be substituted. Hardstem bulrush nutlets are an important waterfowl and shorebird food, while muskrats and geese eat the rhizomes and stems.

Terrestrial vegetation samples will be collected during the early part of the growing season in conjunction with small mammal population analysis and tissue collection. Grass and sagebrush will be sampled in late May or June. A field team member will assess species presence and abundance within each randomly selected 100 × 100-m (110 × 110-yd) grid. If wheatgrass or sagebrush is unavailable, the nearest grid that contains a sufficient amount of these species will be evaluated.

Each vegetation tissue sample will be a composite of material from at least five individual plants of the same species. Individual plants should be randomly selected from within each 100 × 100-m (110 × 110-yd) grid. Plants sampled should be distributed across the plot if possible. Atypical individuals (i.e., resembles less than 5% of the plants for the area) based on size or herbivory should not be included. If possible, approximately equal amount of vegetation should be collected from each individual planet.

Clean disposable gloves should be worn. Plant samples should be clipped with pruning shears or grass shears (as appropriate). Plant material from each of the five radial plots should be combined into one plastic bag to make a composite sample. Sagebrush should be clipped on at least two sides and at two different heights to obtain a representative sample.

A minimum weight of fresh biomass required for each analysis is to be provided in the field guidance forms. Sample weight should be verified in the field to ensure that an adequate quantity has been collected. Plant samples should be placed into a sealable plastic bag that has been placed into another sealable plastic bag. Sharp points on woody vegetation should be bent or broken off within the bag to avoid bag puncture. Bags should be labeled, and the field data should be recorded in notebooks or on field data sheets. Samples should be placed in a cooler on ice until frozen or shipped to the laboratory.

Grass samples should be collected by clipping above ground level (e.g., 1.3 to 5.1 cm [e.g., 0.5 to 2 in.]) with grass shears. Clipping should be adjusted, as needed, to minimize sampling dead vegetation from previous years and to maximize sampling green vegetation from the current growing season. All material above the cutting height will be collected. Dead material should be removed from the sample by hand if unavoidably collected. Grass samples will include new growth of leaves, stems, and any inflorescences present on the plants. It is desirable to remove as much dead material as possible; however, this might be impractical, and an estimate of the percentage of dead material should be noted.

Shrub samples (leaf and stem growth from the current season) should be collected using pruning shears. Shrubs should be clipped at a height between 0.5 and 1.5 m (0.55 and 1.6 yd) on at least two sides. It is common to also collect woody material during this process. Stripping and keeping fresh leaves and stems from the woody material might be necessary.

Aquatic plants should be collected along the margins of the wastewater ponds. One composite sample will be collected at each aquatic sample location. The aboveground portion of each plant should be cut and placed in a labeled, heavy-duty plastic bag and then placed in a cooler with ice for transport to the analytical laboratory.

These procedures can be modified in the field, as appropriate, based on the professional judgment of the field team leader (FTL). All modifications will be documented in the field logbook or on the field sampling data sheets. Soil samples collocated with the plant tissue samples (composited from each corner and the center of the 100 × 100-m [110 × 110-yd] grid) also will be collected.

B-2.1.2 Mammal Sampling Procedure for Analytical Sampling

The deer mouse *(Peromyscus maniculatus)*, a primary prey item for both secondary and tertiary consumers is commonly used to represent several important linkages in the food chain and is the primary choice for collection because it is omnivorous, widespread, and relatively easy to collect.

Mammal sampling will be performed in accordance with applicable sections of TPR-145 and the following information. Deer mice will be collected for tissue analysis. Typically, it will be necessary to collect several deer mice for each analysis to obtain the 60 g of tissue required. Deer mice will be composited to obtain the required tissue amounts. Compositing will not include segregation of small mammals by sex or age but will be limited to the single species. Small mammal species—other than deer mice—will be weighed, measured, ear tagged, have other life history or details recorded in the field logbook, and released.

The same trapping design (see Section B-3.1.3) used to evaluate small mammal population/community data will be used to collect deer mouse tissue samples for analytical assessment. Ten trapping locations or sample plots will be used in each grid. Each sample plot will require a 2- to 3-week trapping period and will consist of 100 traps placed along 10 parallel transect lines (10 traps on each). Each transect will follow a roughly straight line 100 m (110 yd) long. An example of the transect design is shown in Figure B-1.

At each plot, traps will be opened Monday afternoon and left open (weather permitting) 3 nights (Monday through Wednesday night), closed 4 nights (Thursday through Sunday), and then reopened an additional 3 nights (Monday through Wednesday night). If the weather becomes too hot, it may be necessary to close traps during the day to minimize mortality of diurnal species. Once an animal is trapped, a uniquely numbered ear tag will be attached. The ear tag correlates with the trap location, genus, species, collector's initials, and date recorded in a field logbook. The animal should be emptied into a plastic bag. It should be sexed, aged (adult/juvenile), weighed, and identified to its species if possible. A ruler should be used to measure the head-body length, ear (from skull to tip), tail, and right hind foot to the nearest millimeter. The animal should then be returned for release to the location it was trapped. All information should be recorded on the data sheet.

Deer mice will be collected for chemical and radiological analysis, genetics, and histopathology. On the last day of the population surveys, at least three deer mice in each grid will be retained as a single composite sample. Animals to be sacrificed for contaminant analysis will be dispatched in the field. After dispatch, each carcass will be weighed and placed in another clean plastic bag. The amount of sample material in the composite sample will be determined by summing the weights of the individual specimens from each location. Processing should take place as soon as possible after checking traps to reduce potential degradation of the specimen. Samples will be placed on ice for transport to the processing center.

Portions of each animal's liver and kidney will be collected for weight and histopathology. A ventral incision will be made with a clean scalpel blade. The liver and kidney will be removed and weighed to the nearest 0.01 g. Small sections of the liver and kidney will be sliced and placed in a 10% buffered formalin. This solution is potentially carcinogenic and should be handled with caution that is detailed on the respective material safety data sheets. The jar will be labeled with appropriate sample information (i.e., time, date, and sample identification number). Small sections of maternal and fetal tissue will be removed from female mice. The carcasses will be placed in a sealable plastic bag and placed inside another bag with the sample labeled. Chain-of-custody forms will be filled out.

Tissue samples for residue analysis should be frozen and shipped on Blue Ice (or equivalent) to the laboratory. Dry ice can cause serious skin burns if handled incorrectly. Gloves should be worn when handling dry ice.

A single voucher specimen will be photographed but will not be analyzed for contaminants. An experienced wildlife biologist will examine the voucher specimen to verify genus and species.

B-2.2 Soil Analytical Characterization

Soil samples will be collected from the surface 0 to 5 cm (0 to 2 in.) and subsurface 5 to 61 cm (2 to 24 in.) or bedrock (i.e., limited to two sampling intervals) and will consist of composites from locations within the sampling plot designs that correspond to plants from which vegetation samples are collected.

Before sampling, it is important to calculate the total volume of sample material that will be needed from each increment sample location to ensure that the volume required for each analysis is available to completely fill each sample container. The analysis-specific volumes are specified in the Attachment A field guidance forms. Sampling locations specified will be identified and marked using surveying stakes, lath, or flags. The soil will be evaluated for contamination concentrations.

B-2.2.1 Surface Soil Material

Composite surface material samples will comprise five increment subsamples collected from each of the corners and center point of a 100-m (110-yd) square. All or a portion of the increment samples will be mixed together to create a composite sample representative of average constituent concentrations within the area to be investigated. For a given composite sample, the volume of each increment sample must be the same and must equal 1/n of the required composite sample volume, where n equals the number of increment samples making up the composite sample.

Surface material samples will be collected as follows:

1. At each subsample location, an area approximately 61 cm (24 in.) in diameter is cleared of surface vegetation, nondecomposed plant litter, and debris.

2. A decontaminated stainless-steel spoon or hand auger is used to collect surface material to a depth of 5 cm (2 in.). A stainless-steel pick can be used as needed to loosen the soil. To the extent possible, gravel-size or larger particles and debris are eliminated, based on visual observation.

3. The material is described visually, and observations are recorded on the soil sample field data sheet.

4. The increment sample is sieved through a No. 10 mesh if rocks are present and the fine fraction is placed into a decontaminated stainless-steel mixing bowl and then thoroughly mixed.

5. For composite samples, Steps 1 through 4 are repeated at each increment sample location for that composite sample, adding each successive increment sample to the mixing bowl.

6. The sample material is mixed in the stainless-steel bowl using a decontaminated stainless-steel spoon then placed into the appropriate laboratory-supplied sample containers.

7. The containers are labeled and handled as required. Soil subsample location descriptions and collection information will be documented in the logbook in accordance with Management Control Procedure (MCP) -1194, "Logbook Practices for ER and D&D&D Projects."

B-2.2.2 Subsurface Soil Material

Subsurface material samples will be collected as composite samples. Before sampling, it is important to calculate the total volume of collected sample material at each increment sample location to ensure that the volume required for each analysis is available to completely fill each sample container. The analysis-specific volumes are specified in the Appendix A field guidance forms. Specified sampling locations will be identified and marked using surveying stakes, lath, or flags.

Composite surface material samples will comprise five increment subsamples collected from each of the corners and center point of a 100-m (110-yd) square. All or a portion of the increment samples will be mixed together to create a composite sample representative of average constituent concentrations within the area to be investigated. For a given composite sample, the volume of each increment sample must be the same and must equal 1/n of the required composite sample volume, where n equals the number of increment samples making up the composite sample.

Subsurface material samples are collected as follows:

1. At each sample location, clear an area approximately 61 cm (24 in.) in diameter of surface vegetation (nondecomposed plant litter) and debris.

2. Use a decontaminated stainless-steel spoon or hand auger to collect subsurface material from a depth of 5 cm (2 in.) to no more than 61 cm (24 in.) below ground surface. A stainless-steel pick can be used as needed to loosen the soil. To the extent possible, remove gravel-size or larger particles and debris. Record the depth for each soil core collected.

3. Record observations of the soil sample field data sheet.

4. Sieve the soil through a No. 10 mesh (if gravel or rocks are present) into a decontaminated stainless-steel mixing bowl and then mix.

5. For composite samples, repeat Steps 1 through 4 at each subsample location, adding each successive increment sample to the mixing bowl.

6. Mix the soil in a stainless-steel bowl using a decontaminated stainless-steel spoon then place it in the appropriate laboratory-supplied sample containers.

7. Label and handle the containers as required and document the soil subsample location descriptions and collection information in the logbook in accordance with MCP-1194.

8. Collect Global Positioning System information from the center of each sample grid location.

B-2.3 Soil Nutrient and Physical Characterization

Soil samples for soil nutrient and physical characterization will be collected at the same locations as soil samples for contaminant analysis. Each composite sample will be collected as follows:

- Soil sampling sites will be collocated with chemical and radiological soil samples.
- After collection of the chemical analysis samples (described above), appropriate amounts of homogenized soil will be placed into the shipping containers for analysis. Approximately 500 g will be placed into a sealable plastic bag for soil nutrient and physical characterization.
- The containers will be labeled and handled as specified in the field sampling plan (FSP).

These procedures can be modified in the field, as appropriate, based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets.

B-3. EFFECTS SAMPLING

B-3.1 Population/Community Data

Ecological populations or communities are usually large and complex. These systems must be described and quantified to compare them with one another or assess changes in them. Several ecological variables can be measured (e.g., density, frequency, coverage, and biomass) to describe populations and communities. These measurements are used to characterize aspects of populations and communities such as presence/absence, population density, population distribution, species diversity, and productivity (biomass).

B-3.1.1 Vegetation

Fifty Daubenmire quadrats will be collected at each of the 10 AOC plots. Transects will be located between each of the 10 trapping lines (see Figure B-1) in each 100 × 100-m plots. Each transect line will have five quadrat locations spaced approximately 2 m (6 ft) apart. These locations will be selected by striding 20 to 25 paces between quadrats starting at the edge of the 100 × 100-m plot. The quadrat frame will be placed with the left side of the short end of the frame at the edge of the right foot. A 1 × 3-m (1.1 × 3.3-yd) quadrat will be used to estimate percent ground cover. As the quadrat frame is placed along the tape at the specified intervals, the canopy coverage of each plant species will be estimated. In addition, the data will be recorded by quadrat, species, and cover class. Canopy coverage can be estimated, as follows, for both perennial and annual plant species:

1. The quadrat frame is observed directly from above, and the cover class for all individuals of a plant species in the quadrat is estimated as a unit. All other kinds of plants are ignored as each plant species is considered separately.

2. A line drawn about the leaf tips of the undisturbed canopies (ignoring inflorescence) is imagined, and these polygonal images are projected onto the ground. This projection is considered “canopy coverage.” The classes that the canopy coverage of the species falls into can be determined (see Table B-1).

3. Canopies extending over the quadrat are estimated even if the plants are not rooted in the quadrat.

4. The data are collected during a period of maximum growth for key species.

5. For tiny annuals, it is helpful to estimate the number of individuals that would be required to fill 5% of the frame. A quick estimate of individuals in each frame will then provide an estimate as to whether the aggregate coverage falls in Class 1 or 2, etc.

6. Overlapping canopy cover is included in the cover estimates by species; therefore, total cover might exceed 100%. Total cover might not reflect actual ground cover.

Table B-1. Plant cover classes.

Coverage Class	Range of Coverage (%)	Midpoint of Range (%)
1	0 to 5	2.5
2	6 to 25	15.0
3	26 to 50	37.5
4	51 to 75	62.5
5	76 to 95	85.0
6	95 to 100	97.5

While using this method, it is important to keep track of the growth form of each species so that comparisons of grass vs. forb vs. shrub can be made. In addition, an estimation of the cover of bare ground and rocks will provide additional characterization data. While conducting this survey, it is important to remember to record total cover for each quadrat, because this might differ from the sum of the cover values for individual species (due to plant canopy overlap). The surveyor should have a cover category for each quadrat among all identifiable species, mosses (if any), bare ground, rocks, and total cover.

Within each quadrat, the shrub height will be measured by species. To measure shrub height, one person will hold a telescoping rod or other measurement device in the center of a shrub while the other person records the height. If no shrub is present within the plot, the closest shrub(s) to the quadrat of each of the dominant species will be measured.

Once the surveys are complete, the species cover can be estimated by multiplying the number of times a class is recorded by the midpoint of that cover class, adding the results for each class, and calculating an average by dividing by the total number of quadrats sampled. Data are usually collected from many quadrats located along a transect, so that the transect is the sample unit. Therefore, data must be collected from several transects to determine the sample's precision for statistical analysis of cover data.

This method recognizes the difficulty in accurately assigning an exact percent cover value to each quadrat, because even highly experienced workers are unlikely to visually estimate closer than about 5% cover. Assigning broad cover classes provides an equally accurate result as long as the data follow a normal distribution around the midpoint within each class. The narrower upper and lower classes of the Daubenmire scale protect against skewed data in extremely sparse or dense vegetation.

Ranking the data into broad classes is also a relatively rapid procedure because observers are not required to spend as much time contemplating quadrat cover to the nearest percent. In fact, rapid evaluation of each quadrat is the key to success with this approach, since a large sample is less sensitive to the occasional incorrect ranking.

B-3.1.2 Avian

The avian wildlife on designated study areas at the INL Site will be monitored with point counts and nest searches. Avian point counts will be conducted to assess species occurrence and relative abundance in each study area. Point counts have been used throughout North America for long-term bird monitoring programs such as the Breeding Bird Survey (BBS). The BBS is a roadside route survey of avifauna designed to monitor abundance and distribution of birds in both the U.S. and southern Canada. It began in the eastern U.S. in 1966 but is now nationwide in scope (Bystrak 1981; Robbins et al. 1986). Since 1985, official BBS and modified "mini-routes" have been surveyed at the INL Site (Belthoff and Ellsworth 1999). Nest searches will be used to evaluate the feasibility of harvesting eggs for toxicology research.

Each area of concern (i.e., each WAG) will be divided into 10 randomly chosen 100 m^2 plots according to the small mammal trapping protocol. These plots will be used as a reference for designing walking or driving routes through each area. Routes will be designed to survey an area similar to that covered by the mammal plots, and points will be located near or in the plots as often as possible. Points will be located at least 400 m from the nearest neighboring point. Each point will be named, flagged, and marked using a global positioning system (GPS). Each route consists of 10 point count locations. The route for the reference area was established in 2004 and will remain the same in subsequent years.

Breeding Bird Surveys are conducted during the peak of the nesting season, primarily in June, although surveys in desert regions and some southern states (where the breeding season begins earlier), are conducted in May (http://www.mbr-pwrc.usgs.gov/bbs/genintro.html). Similar to the surveys already established on the INL, the LTEM project surveys will be conducted from mid June to early July. Surveys will be performed only when weather conditions are satisfactory as prescribed by the BBS protocol. Temperature, wind speed, and cloud cover at the start and end of each survey will be recorded in an entry form as presented in Attachment A.

Each point along a route will be the site of one 3-minute, unlimited radius point count. At each point an observer will count all the individuals seen or heard within the allotted time period. Counting the same individual twice should be avoided even if encountered at different count locations. Surveys begin approximately one-half hour before sunrise and continue until three replicates are completed, with at least 45 minutes elapsing between the start of one replicate and the start of the next. This avoids potential bias that disturbance may cause in subsequent replicates. Surveys will not be conducted during inclement weather, which includes any amount of precipitation, wind exceeding 12 mph, or other conditions that interfere with detecting birds by sight or sound.

Nest searches will also be conducted within the designated mammal plots. Surveyors will systematically walk through each grid with drag lines, or by visual inspection, and flag the location of any nests that were found and record the species and other pertinent information about the nest site. Nests will be digitally photographed.

B-3.1.3 Small Mammals

Small mammals will be evaluated by using live trapping methods. The 10 sample plots established for biota and soil analytical sampling will be used to assess the small mammal population/community

data in the sampling area. Each sample plot will require a 2- to 3-week trapping period and will consist of 100 traps placed along 10 transect lines (10 traps on each) in a line grid formation. Each of the transects will approximately follow a 100-m-long (110-yd-long) straight line. An example of the transect design is shown in Figure B-1.

Traps will be left open four nights, closed three nights, and then reopened an additional four nights. Once an animal is trapped, a uniquely numbered ear tag will be attached. The ear tag will correlate with the trap location, genus, species, collector's initials, and date recorded in a field logbook. The animal should be emptied into a plastic bag. It should be sexed, aged (adult/juvenile), weighed, and identified to its species if possible. A ruler should be used to measure the head-body length, ear (from skull to tip), tail, and right hind foot to the nearest millimeter. The animal should then be released to the original location from where it was trapped. All information should be recorded on the data sheet.

The mark-and-recapture method will be used in estimating population densities. This method involves several steps:

1. Trapping and marking some individuals of a population

2. Releasing the known number of marked individuals back into the population from which they were captured

3. Trapping some individuals of the population after the marked individuals have had a chance to redistribute themselves into the population

4. Estimating the total population size by a series of computations that are based on the ratio of marked to unmarked individuals in the recapture attempt.

Generally speaking, if the population is large, the marked individuals will become diluted within the population and only a few of the marked individuals would be expected to appear in the second sample. If assumptions about the sampling and animals' distribution are correct, then the proportion of marked individuals in the second sample would be the same as the entire population.

Like all estimation procedures, a number of assumptions must be met to validly use this method:

- The two samples taken from the population must be random samples (i.e., all individuals in the population have an equal and independent chance of being captured during the time of sampling).

- There is no change in the ratio of marked to unmarked animals, meaning that from initial capture to recapture, there must be no significant addition of unmarked animals to the population through births or immigration.

- The population losses from mortality and emigration must remove the same proportion of marked and unmarked individuals.

- The marking of individuals does not affect their mortality.

- Individuals do not lose marks.

The Peterson-Lincoln Index, the simplest method for determining the population size, will be used. The total population can be estimated as follows:

- Assume the total estimated population size contains N individuals.
- Sample M individuals from this population, mark these animals, and return them to the population.
- Sample a second set of n individuals from the population; this sample contains recaptured animals (i.e., individuals captured and marked in the first sampling).
- Estimate the population size, N, by the following equation.

$$N = Mn / R \quad \text{(B-1)}$$

Equation (B-1) might overestimate the population size (i.e., it is biased) when samples are relatively small. Nc is a nearly unbiased estimate of population size if the number of recaptured animals, R, is at least eight. Using Equation B-2 can reduce this bias:

$$Nc = \frac{(M+1)(n+1)-1}{R+1} \quad \text{(B-2)}$$

The approximate variance, s^2, of this estimate is in Equation B-3 below:

$$s^2 = \frac{(M+1)(n+1)(M-R)(n-R)}{(R+1)^2(R+2)} \quad \text{(B-3)}$$

With the standard deviation, s, 95% and 99% confidence limits on the population estimate are given by Equations B-4 and B-5 below:

N (or NC) + 1.96(s)(95% confidence limits) (B-4)

and

N (or NC) + 2.58(s)(99% confidence limits). (B-5)

B-3.1.4 Reptiles

Several methods were evaluated in 2005 to determine which method or combination of methods were the best for monitoring sagebrush and horned lizards. Pitfalls and track plates were unreliable. In a perfect world, active searching along with capture, mark, and release would be a good option for studying reptile populations. However, except for the short horned lizards, the little guys move too fast for humans to reliably catch when it is warm. You can see them; you just cannot catch them even after leaping head first into *Artemisia Tridentata* and scratching the human arm between the elbow and the wrist.

So, in 2006 at each plot, team members will watch for and record reptile activity while checking small mammal traps. If possible, when checking the traps, technicians should walk facing north or south because it is easier to detect lizards if the sun is to the right or left of the person. When a reptile is observed, the recorders will write down the plot number, the time each plot is surveyed, the air temperature, and the species. Also surrounding habitat and weather (cloud cover) will be recorded.

B-3.1.4.1 Observational Study, Transects, and Track-Plates. At each plot, each team member will watch for and record reptile activity while checking traps during the morning and afternoon. If possible, when checking the traps, technicians should walk facing north or south because it is easier to detect lizards if the sun is to the right or left of the person.

In the morning, when a reptile is observed, the recorders will write down the plot number, the time each plot is surveyed, the air temperature, and what species were seen. Also surrounding habitat and weather (cloud cover) will be recorded.

On the last day of the first week of small mammal trapping, sheets of aluminum or other types of material to provide an attractive microhabitat will be located across a selected number of plots at even intervals (depending on ability to place a sheet). Ten sheets of approximately 3 × 3 ft will be used.

At these plots, tracking plates and possibly scent stations will be used for animal and reptile detection by luring them to a scent and recording their footprints in a tracking medium. Scent stations consist of 1 × 1-m aluminum plates, heavily smoked with flame, as the tracking surface (Barrett 1983). The scent station attractant, cat food, or predator survey discs will be placed in a slightly elevated position at the center of the station. Stations will be checked for visitation early each morning and tracks will be cleared when necessary. Tracks can be lifted from the plates by lightly pressing with a wide piece of transparent tape. Track outlines will be identified and placed in notebooks for future reference. Track plates should be cleaned and the tracking medium replaced when rain, heat, or signs disturb the carbon-coated surface.

B-3.1.4.2 Intensive and Systematic Searching. Intensive and systematic searching will be performed on a selected number of plots at each area of concern. The plots selected will be based on the observational data collected during the mammal trapping.

If captured, collection data recorded (see Attachment A) includes; sex, weight (g), snout-vent length (mm), and tail length (mm). A unique number will be written with permanent marker on the ventral surface to identify the individual. Painting the side or leg with a noticeable color of fingernail polish changing day-to-day may also be used to help identify an already-captured animal without recapturing. If not captured, the species and location will be noted.

Note the following when performing intensive searching of terrestrial plots:

- The use of gardening gloves is recommended to avoid bites from ants and other invertebrates.
- When sampling areas that are known habitats of venomous snakes, care should be taken to avoid getting bitten. Hand-held rakes or small sticks can be used to search the leaf litter and when turning logs and rocks. Always turn the log or rock toward you, so that if an aggressive snake is present, your feet are somewhat protected by the log or the rock.

B-3.2 Earthworm and Plant Bioassay Soil Samples

Bioassay soil samples will be collected at each plot. Each composite sample will be collected as follows:

- Soil will be taken evenly from 0 to 30 cm. A composite sample of 4 gals will be collected from five locations at each plot. The five locations will be from the center and four corners of the plot.

- Containers will be labeled with the date, location, and other appropriate information and shipped on ice to the bioassay laboratory for processing.

These procedures can be modified in the field, as appropriate, based on the professional judgment of the FTL. All modifications will be documented in the field logbook or on the field sampling data sheets.

B-3.3 Soil Fauna[a]

B-3.3.1.1 The Animals to be Enumerated. Microarthropods comprise two soil fauna groups: (1) Collembola, also known as springtails, and (2) Acari, also known as mites. The microarthropods are typically the most abundant soil animals in surface layers, especially in association with litter inputs from plants. The size range for microarthropods is 0.1–2.0 mm. Many of these animals are fungus feeders, but many are also predators on each other and on nematodes and flies' eggs. There is a great diversity of species of microarthropods in soil, and considerable time is needed to identify each specimen to species. The approach taken is usually to divide the animals into major subdivision groups within the Collembola and Acari for counting purposes. The animals occur in the field densities in the range 1,000–50,000 per m^2, although the lower part of this range is expected for dry environments.

B-3.3.1.2 Collection of Field Samples. Samples are to be collected as undisturbed soil discs. One sample will be taken from each plot at each area of concern. Each plastic disc circular is 77 mm in internal diameter and 88 mm in external diameter, has a 4-mm depth, and a 45-degree bevel on one outside edge to permit entry into the soil. Each disc is driven flush into the soil using a hammer and wooden board placed above. The disc is then removed intact with litter using a hand trowel and placed upright on a flat surface for immediate transportation to the laboratory.

B-3.3.1.3 Extraction of Fauna from Field Samples. The fauna are subjected to an active extraction for removal from soil. The active extraction can be summarized as applying heat and light above the sample so that the animals walk out the bottom of the disc, where they are collected. The active extraction takes 3–7 days to complete, but it has the advantage of recovering the animals in good condition and mostly free of soil and other debris. Physical separation of animals from field samples by use of high-density fluids is not preferred because animals are typically recovered in poor condition. Full details of available extraction methods are given in "Soil Invertebrates" (Coleman et al. 1999) and *Standard Soil Methods for Long-Term Ecological Research* (Robertson et. al 1999).

Discs returned to the laboratory will be moistened by adding 20 ml water to the surface using a pipette and placed upper surface down into extraction units established in the laboratory. Twelve extraction units can run in the laboratory simultaneously so that three field collections will be processed in separate extraction runs to make 36 samples in all. Each extraction unit has a fiberglass screen nylon mesh supported on a coarse wire grid above a funnel that collects to a plastic vial. A screw-fit lid with an upper airway covers the disc sample to delay moisture loss. A single light with a 60-watt bulb is placed immediately above each disc for up to 7 days, and the fauna are collected in 1-cm depth of 70% ethanol in the vial. Each vial is checked and emptied daily until fauna no longer appear. The total fauna extracted for a given disc is then pooled and stored in 70% ethanol.

B-3.3.1.4 Sorting and Enumeration of Extracted Fauna. All subsequent laboratory work will involve use of the stereoscopic microscope in the laboratory by a knowable expert in this field. Each sample is sorted, using a Pasteur pipette, into major groups within the Collembola and Acari, and the

a. Procedure of the laboratory of Dr. Terence McGonigle (Brandon University, Manitoba, Canada) for the determination of soil fauna of microarthropods in a field sample of surface soil with plant litter.

number of animals for each group will be counted. The sorted samples are stored in 70% ethanol in separate glass vials, one for each major group for a disc. The major groups recovered are expected to be as shown in Table B-2.

Table B-2. Major groups expected.

Collembola[a]	Acari
(All are fungivores)	Mesostigmata (predatory)
Podurids	Oribatids adult (fungivores)
Entomobryids	Oribatids juvenile (fungivores)
Neelids	Astigmata (fungivores)
Symphyla	Prostigmata (most are fungivores, predators can be separated)

a. Collembola groups are further subdivided into epigeous (pigmented, seeing) and hypogeous (non-pigmented, blind) life forms.

B-3.3.1.5 Data Report. The data will be returned as a report summarizing the counts of each major group, as described above, with tallies taken separately for each group for each disc. The report will be submitted along with the fauna samples. Spent soil and litter contents of each disc will be returned to the site.

B-3.4 Histopathology and Body and Organ Weight

Tissues will be collected from small mammals for chemical and radiological analysis, genetics, and histopathology. On the last day of small-mammal population surveys (see Section B-3.1.3), at least three deer mice in each sampling plot will be retained as a single composite sample. Deer mice will be humanely harvested by cervical dislocation or asphyxiation with carbon dioxide gas before transport to the laboratory. Animals should be removed from traps one at a time, so that specimens are not misidentified. Processing should take place as soon as possible after trap checks to reduce potential degradation of the specimen. The deer mice will be weighed in the laboratory to the nearest 0.01 g.

A ventral incision will be made with a clean scalpel blade. The liver and kidney will be weighed to the nearest 0.01 g. Small slices of each will be placed in 10% buffered formalin and the rest will be returned to the carcass. This solution is potentially carcinogenic and should be handled with caution, as detailed on the material safety data sheet. The jar will be labeled with appropriate sample information (time, date, sample identification number, and ear tag number).

The carcasses forming the single composite sample will be placed in a sealable plastic bag, placed inside another bag, and then labeled for contaminant analysis. Chain-of-custody forms will be filled out.

The removal of the kidney and liver may slightly reduce apparent concentrations. Estimated loss in concentration is as shown in Equation (B-6):

$$\text{mg/kg WB} * \text{kg WB} + \text{mg/kg L} * \text{kg L} + \text{mg/kg k} * \text{kg k} \quad \text{(B-6)}$$

where:

mg/kg WB = concentration in whole body

mg/kg L = concentration in liver (estimated)

mg/kg k = concentration in kidney (estimated).

A bioaccumulation factor from the literature will be used to estimate the fraction lost to histopathology. Although the bioaccumulation factor introduces uncertainty into the assessment, the liver and kidney tend to concentrate metals and might exhibit cellular changes for evaluation of effects from exposure. If effects are determined to be present, a selected study will be performed to further characterize this problem, or the sampling approach will be modified appropriately.

B-4. AQUATIC ECOSYSTEM CHARACTERIZATION

Chilly Slough was selected as the aquatic reference area.

B-4.1 Sediment and Surface Water Analytical Sampling

Sediment and surface water samples will be obtained from the reference area and from the waste ponds at the Materials and Fuel Complex. The data will be used to predict health effects and exposure in aquatic receptors. Five grab samples of each medium will be collected from the pond in locations determined in the field. The locations will be surveyed using a GPS unit.

B-4.2 Biota Analytical and Effects Sampling

If appropriate aquatic receptors (tadpoles or frogs) are identified and present, they will be collected and identified to the lowest taxonomic level possible. Sixty grams is required for all analytical work. Five samples will be collected from the pond.

Attachment A

Survey Forms and Data Sheets

Date _____

Weather Conditions _____

Cloud cover _____

Reptile Data Sheet

location	plot #	nearest trap #	species	time (24 hrs)	air temp (degree C)	sex	weight (g)	SVL (mm)	tail (mm)	habitat/comments

Page Number _____

Name ____________________

Date ____________________

Daubenmire Plot Form

Location ______________

Plot Number ______________

DaubPlot #																														
Species	1/4	1/2	1	1/4	1/2	1	1/4	1/2	1	1/4	1/2	1	1/4	1/2	1	1/4	1/2	1	1/4	1/2	1	1/4	1/2	1	1/4	1/2	1	1/4	1/2	1

Dauabenmire Data Sheet

Checker ____________________

Page Number ______________

Recorder's Name _____

Trapper's Name _____

Small Mammal Data Sheet

Date _____

Location _____

Plot # _____

	Trap #	Species	Tag #	Body (mm)	Tail (mm)	Foot (mm)	Ear (mm)	Sex	Mass (g)	Recapture	Dead?	Other
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
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21												
22												
23												
24												
25												

Checker signoff _____

Page Number _____

Observer: _____

Nest Count Data Form

Date	Location	Nest ID	Species	# of eggs	# of young	Nest Site Description	Comments

Observer: ______________ Temperature: ______________

Date: ______________ Wind: ______________

Avian Point Count Data Form

Cloud cover: ______________

Location	Time	Species	Tally			Notes
			< 50 m	> 50 m	Fly Overs	

Page # ________